3.10 Social and Economic Values

Issues associated with social and economic values include potential impacts to local jobs and employment, tax and other revenue changes, impacts to public services, changes in property values, and impacts to local growth and development and quality of life.

3.10.1 Affected Environment

The study area for social and economic values encompasses approximately a 20-mile radius from the proposed Three Oaks Mine. This is expected to be a reasonable commuting distance for the majority of workers. This study area covers a substantial portion of Bastrop, Lee, and Milam Counties, including most of the major population centers in the three counties. It also includes small portions of Travis and Williamson Counties; however, except for the City of Taylor, it encompasses only small percentages of the population and economic activity of those counties. Consequently, the analysis does not provide much coverage of either Travis or Williamson Counties. The cumulative effects area for social and economic issues includes essentially the same area; however, it also considers projects or major economic activities outside the study area that would affect communities within the study area.

3.10.1.1 Population

The estimated combined population of Bastrop, Lee, and Milam Counties was 97,628 in 2000, a net increase of 31.8 percent from the 1990 Census. As shown in **Table 3.10-1**, Bastrop County experienced the highest rate of population growth during this period (50.9 percent). Lee and Milam Counties experienced lesser, though still positive, growth with a 21.8 percent increase for Lee County and a growth of 5.6 percent for Milam County over this same time period. Statewide population grew from 16,986,335 in the 1990 Census to 20,851,820 in this period, a 22.8 percent increase (**Table 3.10-1**).

Table 3.10-1
Population Change 1980 to 2000

County	Population Level			Population Change	
	1980 Census	1990 Census	2000 Census	1980 to 1990	1990 to 2000
Bastrop	24,726	38,263	57,733	54.7%	50.9%
Lee	10,952	12,854	15,657	17.4%	21.8%
Milam	22,732	22,946	24,238	0.9%	5.6%
County Totals	58,410	74,063	97,628	26.8%	31.8%
Statewide	**14,225,513**	**16,986,335**	**20,851,820**	**19.4%**	**22.8%**

Source: U.S. Census Bureau 2001.

Population in the local area grew at a somewhat faster rate between 1990 and 2000 than from 1980 to 1990, as shown in **Table 3.10-1**. In the 1990s, the three counties' combined population growth clearly outpaced the overall statewide growth rate. Bastrop County continued as the driving force in terms of actual numbers as well as having a sustained high growth rate, but Lee and Milam Counties also experienced notable increases in their rates of growth.

Texas' statewide population is expected to increase by over 50 percent between 2000 and 2030, as shown in **Table 3.10-2**. The three counties' combined population is expected to outpace the statewide growth rate over the same time span, with Bastrop County forecasted to be responsible for most of this growth.

Table 3.10-2
Projected Population Levels from 2000 to 2030

County	Actual		Projected		
	1990	2000	2010	2020	2030
Bastrop	38,263	57,733	79,326	106,507	135,063
Lee	12,854	15,657	17,771	20,047	21,933
Milam	22,946	24,238	24,007	23,873	23,300
County Totals	74,063	97,628	121,104	150,427	180,296
Statewide	**16,986,335**	**20,851,820**	**23,888,830**	**27,411,952**	**31,346,172**

Sources: Texas Comptroller of Public Accounts 1998.

Bastrop County is projected to continue its relatively high population growth rate of the past two decades into the future, growing by 134 percent from the year 2000 to 2030. Lee County's population is projected to continue its expansion, increasing by 40 percent from 2000 to 2030, while Milam County's population is expected to decline slightly over the same time frame.

3.10.1.2 Employment

The size of a county's labor force is measured as the total number of people currently employed and the number actively seeking employment. Bastrop County has experienced significant growth in the size of its labor force, growing by 56.3 percent from an average monthly size of 18,510 in 1990 to 28,923 in the first 8 months of 2000 (**Table 3.10-3**). This dramatically surpassed the statewide growth of 20.4 percent over the same time. Lee County experienced growth of 19.9 percent, while Milam County's labor force was essentially unchanged, declining by 1.3 percent during the 10-year period.

In addition to experiencing relatively low unemployment and significant labor force growth since 1990, Bastrop County also has experienced growth in its labor force participation rate. This rate is the percentage of the total population in the county that is involved in the active labor force; thus, it provides a measure of the share of the total population that are either job holders or job seekers. **Table 3.10-4** illustrates the labor force participation rate for the three counties and for the State of Texas for the years 1990, 1994, and 1997. Bastrop County experienced a substantial increase from 1990 to 1997, with 4.5 percent more of the population joining the labor force in 1997 than in 1990. Lee County's rate matched Bastrop's in 1994, but dropped back from 1994 to 1997. Milam County's rate was steady from 1990 to 1994, but slipped lower by 1997.

Table 3.10-3
Average Monthly Civilian Labor Force

County	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000[1]	Average Annual Growth Rate
Bastrop	18,510	18,672	19,693	20,562	22,064	23,229	24,701	25,885	26,839	27,951	28,923	4.6%
Lee	6,149	6,305	6,880	7,120	7,174	7,312	7,088	7,111	7,196	7,175	7,375	1.8%
Milam	9,550	9,866	10,344	10,238	9,856	9,671	9,455	9,457	9,622	9,483	9,423	-0.1%
County Totals	34,209	34,843	36,917	37,920	39,094	40,212	41,244	42,453	43,657	44,609	45,721	2.9%
Statewide (1,000s)	**8,616**	**8,755**	**8,999**	**9,161**	**9,409**	**9,588**	**9,675**	**9,839**	**10,082**	**10,206**	**10,376**	**1.9%**

[1]Data for year 2000 is for the first 8 months of the year.

Source: Texas Workforce Commission 2000.

Table 3.10-4
Labor Force Participation Rate

County	1990	1994	1997	Net Change from 1990 to 1997
Bastrop	48.5%	52.1%	53.0%	4.5%
Lee	48.0%	52.1%	48.3%	0.3%
Milam	41.7%	41.8%	39.1%	-2.6%
Statewide	**50.5%**	**51.3%**	**50.8%**	**0.3%**

Sources: Texas Workforce Commission 2000.

Table 3.10-5 illustrates the average annual monthly employment levels in Bastrop, Lee, and Milam Counties for the years 1990, 1994, and 1997. Bastrop County had the largest number of employed persons (24,808) in 1997, representing a 40.7 percent increase from 1990. Lee County experienced a 17.4 percent gain in employment over that same period, while employment in Milam County remained relatively constant over the 7 years.

Table 3.10-5
Average Monthly Employment Totals

County	1990	1994	1997	Net Change from 1990 to 1997
Bastrop	17,634	21,391	24,808	40.7%
Lee	5,833	6,905	6,846	17.4%
Milam	8,975	9,176	8,903	-0.8%
Statewide	**8,071,300**	**8,802,700**	**9,310,000**	**15.4%**

Source: Texas Workforce Commission 2000.

Unemployment rates in Bastrop and Lee Counties have consistently been below state levels since 1990, while average annual growth rates for wages and labor force size have generally met or exceeded statewide rates of growth during this time. Milam County has trailed the statewide average annual growth in wages and labor force size and has had a substantially lower labor force participation rate from 1990 to 1997. Milam County's unemployment rate has consistently exceeded the rates for Bastrop and Lee Counties; however, it has been below the statewide rate in all but two of the past ten years. **Figure 3.10-1** illustrates comparative unemployment rates for the study area over the past decade.

3.10.1.3 Income

Of the three counties, Bastrop County had the highest personal income per capita ($18,530) in 1997 (**Table 3.10-6**). Lee County ($17,983) and Milam County ($17,460) income levels were slightly lower. Bastrop also experienced the greatest rate of increase in personal income from 1990 through 1997 with a total increase of 39.4 percent, outpacing the growth also attained in Lee (31.9 percent) and in Milam (30.1 percent).

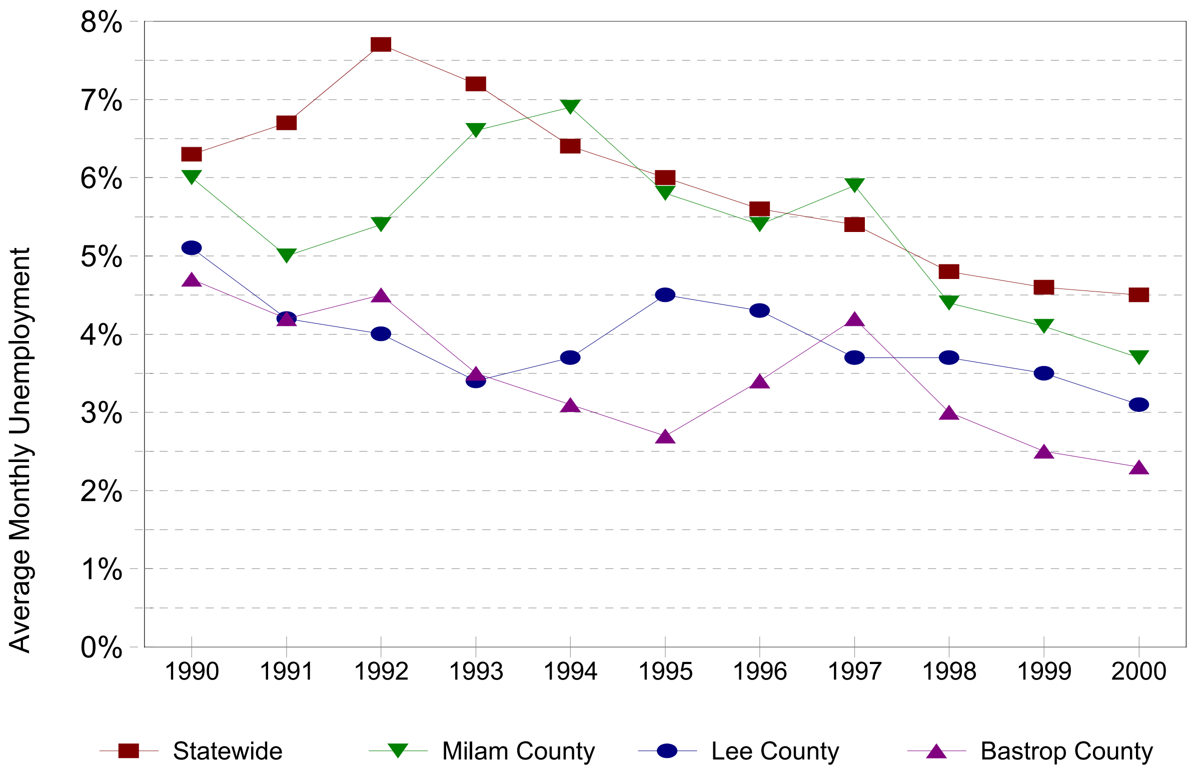


Figure 3.10-1. Comparison of Average Monthly Unemployment Rate (1990 to 2000) – Counties and Statewide

Table 3.10-6
Annual Per Capita Personal Income for 1990 through 1997

County	1990	1991	1992	1993	1994	1995	1996	1997	Net Change from 1990 to 1997
Bastrop	$13,288	$14,024	$14,695	$15,354	$15,954	$16,751	$17,232	$18,530	39.4%
Lee	$13,635	$14,591	$15,959	$16,256	$16,769	$16,873	$16,773	$17,983	31.9%
Milam	$13,422	$14,157	$14,881	$15,714	$15,550	$15,782	$15,982	$17,460	30.1%
Statewide	**$17,290**	**$17,985**	**$18,886**	**$19,606**	**$20,312**	**$21,320**	**$22,345**	**$23,707**	**37.1%**

Source: Bureau Of Economic Analysis 1999.

The three-county area hosts a notable variety of business activities. Total earnings for all industries in the three counties was approximately $683 million in 1997. Bastrop County has a fairly diverse economy. The City of Elgin is host to computer manufacturing, sausage plants, a brick plant, livestock breeding, and medical research. The City of Bastrop, the county seat, relies on manufacturing, the University of Texas cancer research center, a federal correctional center, tourism, and oil-well supply. Smithville's economic activity includes rail maintenance, light manufacturing, an environmental science center, and a hospital. Bastrop County also has a significant agribusiness sector, producing beef cattle, turfgrasses, horses, cotton, wheat, lumber, and firewood. **Table 3.10-7** illustrates the earnings, by industry, for Bastrop County from 1990 through 1997. Government and government enterprises have clearly been Bastrop's largest single industry group during that time span, with the services, retail trade, manufacturing, and construction industries rounding out the top five.

Lee County is home to manufacturing, agribusiness, and oil and gas operations. **Table 3.10-8** shows the annual earnings by industry for Lee County from 1990 to1997. Its agribusiness sector produces beef cattle, meat, goat milk, peanuts, and hay. The City of Giddings has varied manufacturing, food processing, a recycling plant, and a hospital. Government accounted for an average of 19.5 percent of the total industry earnings in Lee County during the period from 1990 through 1997. Minerals and mining (which includes coal mining and oil and natural gas operations) was the next highest with an average of 14.6 percent and the services and construction industries accounted for 13.6 percent and 11.9 percent, respectively, of the total earnings in Lee County from 1990 through 1997.

Milam County's economy is composed of aluminum manufacturing, as well as other manufacturing, lignite mining, agribusiness, and oil and gas production. **Table 3.10-9** displays the earnings, by sector, for industries in Milam County. The City of Cameron, the county seat, is home to some manufacturing and a hospital. Rockdale's economic activity consists of an aluminum plant, a utility company, a hospital, and agribusiness.

The official data shown in the table for Milam County incorporate Alcoa's operations into the manufacturing category. Worker earnings from Alcoa's Sandow Mine are, consequently, not shown as mining income, but as income generated in manufacturing. Since Alcoa is an integrated firm, encompassing, mining, electrical

Table 3.10-7
Annual Earnings By Industry in Bastrop County from 1990 to 1997 (in $000s)

	1990	1991	1992	1993	1994	1995	1996	1997
Agriculture	$4,848	$4,761	$5,376	$6,062	$5,923	$7,144	$7,092	$7,429
Minerals and mining	$1,331	$1,739	$996	$984	$795	$961	$1,208	$1,523
Construction	$10,261	$9,783	$13,343	$14,985	$20,363	$23,478	$25,933	$27,742
Manufacturing	$17,228	$17,213	$22,271	$25,636	$26,245	$26,879	$30,355	$28,311
Transport and utilities	$9,751	$9,855	$10,319	$11,175	$12,026	$13,418	$14,355	$16,388
Wholesale trade	$4,219	$4,680	$5,610	$5,878	$4,974	$5,023	$5,568	$5,776
Retail trade	$22,371	$24,063	$26,357	$30,162	$34,020	$39,916	$42,444	$45,009
Finance and real estate	$5,521	$5,717	$5,968	$7,493	$8,022	$8,628	$9,490	$10,371
Services	$28,974	$32,892	$34,303	$39,835	$42,593	$46,123	$50,486	$56,715
Government	$51,330	$55,125	$59,201	$65,116	$71,201	$76,083	$82,057	$90,266
Totals	**$155,834**	**$165,828**	**$183,744**	**$207,326**	**$226,162**	**$247,653**	**$268,988**	**$289,530**

Source: Bureau Of Economic Analysis 1999.

Table 3.10-8
Annual Earnings By Industry in Lee County from 1990 to 1997 (in $000s)

	1990	1991	1992	1993	1994	1995	1996	1997
Agriculture	$2,489	$2,297	$1,871	$2,415	$1,969	$1,996	$1,031	$1,202
Minerals and mining	$12,316	$16,158	$15,487	$18,430	$19,900	$22,534	$21,928	$23,693
Construction	$6,064	$6,931	$16,258	$19,824	$19,633	$20,689	$18,348	$18,394
Manufacturing	$9,079	$9,913	$9,891	$10,789	$12,582	$12,562	$12,465	$13,966
Transport and utilities	$10,270	$11,866	$12,097	$12,875	$13,011	$12,673	$12,637	$13,457
Wholesale trade	$6,408	$8,374	$8,873	$9,892	$10,390	$9,507	$9,571	$9,886
Retail trade	$9,452	$10,443	$11,183	$11,646	$12,647	$13,524	$13,527	$13,912
Finance and real estate	$4,170	$3,836	$3,533	$3,939	$4,966	$5,294	$5,579	$5,552
Services	$13,078	$14,396	$15,855	$16,687	$17,029	$19,529	$20,825	$22,991
Government	$20,818	$22,089	$23,009	$23,971	$24,484	$25,950	$27,953	$30,013
Totals	**$94,144**	**$106,303**	**$118,057**	**$130,468**	**$136,611**	**$144,258**	**$143,864**	**$153,066**

Source: Bureau Of Economic Analysis 1999.

Table 3.10-9
Annual Earnings By Industry in Milam County from 1990 to 1997 (in $000s)

	1990	1991	1992	1993	1994	1995	1996	1997
Agriculture	$3,256	$4,169	$4,121	$4,093	$4,150	$3,820	$3,218	$3,574
Minerals and mining	$1,939	$2,149	$1,790	$3,763	$1,803	$2,554	$3,287	$4,712
Construction	$9,140	$10,973	$16,831	$18,423	$16,502	$17,852	$19,544	$23,153
Manufacturing	$93,671	$95,658	$102,542	$102,309	$97,777	$90,487	$88,762	$94,216
Transport and utilities	$14,742	$15,876	$18,410	$16,676	$15,779	$14,473	$15,107	$15,300
Wholesale trade	$3,054	$2,159	$2,481	$2,653	$3,008	$3,170	$3,335	$4,664
Retail trade	$16,152	$17,091	$17,823	$18,683	$21,011	$21,101	$21,822	$23,383
Finance and real estate	$5,370	$5,878	$6,119	$7,801	$7,857	$8,048	$8,180	$8,990
Services	$20,530	$23,175	$25,769	$26,593	$26,664	$26,296	$28,653	$31,667
Government	$23,124	$24,017	$25,524	$26,508	$27,400	$28,597	$29,902	$30,836
Totals	**$190,978**	**$201,145**	**$221,410**	**$227,502**	**$221,951**	**$216,398**	**$221,810**	**$240,495**

Source: Bureau Of Economic Analysis 1999.

generation, and aluminum, this official categorization leads to an under-representation of the contribution of mining in Milam County's earnings statistics.

Earnings by the manufacturing industry in Milam County have accounted for an average of almost half (44.1 percent) of Milam's total earnings by industry. The government and services sectors account for the next highest average shares over the time period, representing 12.4 percent and 12.0 percent, respectively.

Information on earnings and the size of the civilian labor force generates a measure of the income per labor force participant, most of which are employed. Of the three counties, Milam County has the highest earnings per person in the civilian labor force as shown in **Table 3.10-10**. Using 1996 data for illustration purposes, the Milam County income per labor force participant was $23,460. For that same year, the corresponding calculation for Lee County was $20,297, with Bastrop County lagging significantly at $10,890. The higher income per labor force participant for Milam County helps explain why Milam County has the lowest, and declining, labor force participation rate, as higher income jobs reduce the pressure for multiple worker households.

Table 3.10-10
Total Industry Earnings per Labor Force Participant by County

County	1990	1991	1992	1993	1994	1995	1996	1997
Bastrop	$8,419	$8,881	$9,330	$10,083	$10,250	$10,661	$10,890	$11,185
Lee	$15,310	$16,860	$17,159	$18,324	$19,043	$19,729	$20,297	$21,525
Milam	$19,998	$20,388	$21,405	$22,221	$22,519	$22,376	$23,460	$25,430

Source: Bureau Of Economic Analysis 1999.

3.10.1.4 Public Finance

Bastrop County has the highest property tax rate of the three counties, with a rate of $0.5817 of tax per $100 of a property's assessed value (see **Table 3.10-11**). Lee and Milam County rates are both more than $0.15 lower per $100 in assessed property value.

Table 3.10-11
Total Appraised Property Values

County	Total Appraised Property Value in County (1998)	Tax Rate per $100 of Assessed Value (1998)
Bastrop	$2,023,927,576	$0.5817
Lee	$879,326,635	$0.4164
Milam	$1,257,665,640	$0.3960

Source: Texas Comptroller of Public Accounts 1999.

The Texas state retail sales tax is currently 6.25 percent. Local sales taxes vary by county and by city; county retail sales tax rates are shown in **Table 3.10-12**.

Table 3.10-12
Retail Sales Tax Rates

County	Retail Sales Tax Rate
Bastrop	0.50%
Lee	0.50%
Milam	0.50%

Source: Texas Comptroller of Public Accounts 2000.

Bastrop leads the way, among the three counties, in total sales subject to state and local sales taxes, with $204,639,919 in such sales in 1999 (**Table 3.10-13**). This is more than double the levels of either Lee or Milam Counties. As a result, Bastrop County also led in local sales tax dollar receipts (see **Table 3.10-14**).

Table 3.10-13
Taxable Sales by County

County	1995	1996	1997	1998	1999
Bastrop	$130,946,802	$145,694,603	$155,986,281	$178,380,707	$204,639,919
Lee	$87,747,961	$82,592,325	$89,224,157	$81,774,799	$82,014,283
Milam	$106,442,829	$64,104,700	$65,081,063	$68,949,504	$73,916,828

Source: Texas Comptroller of Public Accounts 2000.

Table 3.10-14
Local Sales Tax Receipts by County

County	1995	1996	1997	1998	1999
Bastrop	$763,625.35	$823,998.67	$864,519.88	$1,018,142.97	$1,129,571.18
Lee	$542,072.83	$454,335.37	$489,600.96	$452,956.37	$444,116.06
Milam	$618,967.50	$730,993.18	$751,656.42	$730,275.41	$816,008.70

Source: Texas Comptroller of Public Accounts 2000.

Bastrop County's four independent school districts (ISDs) have a substantial $1.34 billion property tax base to provide support for their respective schools (**Table 3.10-15**). However, four ISDs in Lee and Milam Counties have higher taxable property values per student than any individual ISD in Bastrop County. At the high end of the range, property taxes provided over two-thirds of the total revenues for the Rockdale ISD in Milam County in the indicated school year.

Table 3.10-15
School District Funding Received from Property Taxes

County School District	Total Assessed Taxable Property Value (1998 Tax Year)	Taxable Value per Student (1998 to 1999 School Year)	School District Property Tax per $100 of Assessed Value (1998)	School Funding Received from Property Tax (%)
Bastrop County				
Bastrop ISD	$770,326,860	$131,815	$1.60	36.2%
Elgin ISD	$299,631,954	$113,583	$1.490	28.6%
Smithville ISD	$243,542,676	$135,754	$1.659	38.1%
McDade ISD	$27,668,994	$156,322	$1.490	35.1%
Total	**$1,341,170,484**			
Lee County				
Giddings ISD	$339,672,704	$194,432	$1.613	49.5%
Lexington ISD	$113,196,825	$119,785	$1.28	28.2%
Dime Box ISD	$68,165,280	$284,022	$1.315	64.0%
Total	**$521,034,809**			
Milam County				
Buckholts ISD	$16,764,366	$90,131	$1.40	17.4%
Cameron ISD	$170,671,680	$99,808	$1.345	25.0%
Gause ISD	$29,897,440	$186,859	$1.55	44.9%
Milano ISD	$31,906,050	$87,175	$1.50	18.5%
Rockdale ISD	$448,020,524	$244,286	$1.475	68.4%
Thorndale ISD	$52,285,884	$117,761	$1.450	23.4%
Total	**$749,545,944**			

Source: Texas Education Agency 2000.

3.10.1.5 Public Education

Public schools in Texas are funded primarily by a combination of local property tax revenues and funds distributed by the state, with small amounts of federal dollars added in. Because of the disparity in property taxing capacity among school districts, the state has a revenue balancing or equalization formula by which it redistributes property tax revenues from tax-rich districts to poorer districts.

Public education in the Three Oaks Mine study area is administered by several independent school districts in each of the counties and major communities. The most likely to be affected by population changes associated with the mine are those in the larger nearby communities such as Rockdale, Elgin, and Giddings, and, to a lesser extent, Thorndale, Taylor, Cameron, and Lexington.

Currently, enrollments at most schools in Rockdale, Elgin, and Giddings are at or near their capacities. Elgin’s two elementary schools are very near capacity with 1,354 enrolled students (Clark 2001; Hutchison 2001). The Elgin Middle School also is at capacity with 644 student, although the high school is still comfortably under its 1,000 student capacity with 855 students enrolled (Hernandez 2001; Hughes 2001).

Rockdale’s schools are at or very near capacity with 882 elementary students, 423 junior high school students, and 500 high school students (Skrhak 2001; Meadors 2001; Blaser 2001). They have space for approximately 25 junior high students and 50 high school students, but few if any additional elementary students.

Giddings has a very small amount of available room at the elementary level with 935 elementary and intermediate students currently enrolled, but it is essentially full at the middle school with 265 enrollees. The high school has 540 students with capacity for 600 to 650 (Dibble 2001; Eichler 2001; Olsen 2001).

3.10.1.6 Housing

Census data indicate that housing in the study area is oriented toward owner-occupancy rather than rental housing. Owner-occupied units make up 80.4 percent of the occupied housing stock in Bastrop County, 79.3 percent in Lee County, and 73.0 percent in Milam County, compared with only 63.8 percent for Texas as a whole. Vacancy rates are typically very low for owner units throughout the area, but reasonably high for rental units. Vacancy rates for owner and renter units, respectively, are 1.3 and 8.9 percent in Bastrop County, 2.3 and 7.7 percent in Lee County, and 3.0 and 9.3 percent in Milam County. Comparable rates for the state are 1.8 percent of owner units and 8.5 percent of renter units. These vacancy rates translate into over 3,800 total vacant housing units in the three-county area at the time of the 2000 Census.

The availability of temporary housing (e.g., motels, campgrounds, etc.) in the study area is uncertain. There are 5 motels in Rockdale with 153 rooms, a total of 225 motel rooms in Giddings, and approximately 20 motel rooms in Elgin. There also is public camping with recreational vehicle hookups at the state parks and recreation areas near Bastrop.

3.10.1.7 Real Estate Values

Land in the vicinity of the Three Oaks Mine is predominantly undeveloped. Over 90 percent of the land within the permit area is open land of various types including pastureland, cropland, and woodland. Lands outside the permit area, including the U.S. Highway 290 corridor in particular, are somewhat more intensely utilized, though still predominantly open. There are a few rural residential subdivisions near the permit area as well as scattered individual residences; however, most of the surrounding land remains open or agricultural.

3.10.1.8 Other Public Services

Emergency services are the principal additional public services that may be of concern regarding the development of the Three Oaks Mine. Hospitals, ambulance services, and fire protection are often taken for granted in urban areas, but are less readily available in rural areas and smaller communities. Hospitals, in particular, are scarce in the study area. Richards Memorial Hospital has a total of 25 beds in Rockdale. There also are small hospitals in Cameron and in Taylor, but none in Lee County and the one in Bastrop County is in Smithville, approximately 30 miles south of the proposed mine site. More serious cases are taken to Austin or Temple, approximately 60 miles from the proposed mine site.

All of the larger communities in the study area have volunteer fire departments staffed by local, on-call personnel. Alcoa also has its own fire fighting capability at the Sandow Mine and smelter facility.

Ambulance and emergency medical services (EMS) are provided by Rural/Metro Ambulance, out of Elgin, for northern Bastrop County and by B&M Ambulance, Inc. from Giddings.

3.10.2 Environmental Consequences

This section describes potential impacts to population, employment, income, public finance, public education, housing, other public services, and real estate values. Projected beneficial effects of employment would last through construction and operation of the Three Oaks Mine (approximately 25 to 30 years). Potential impacts for the Proposed Action were analyzed assuming the development of the Three Oaks Mine as proposed by Alcoa with the scheduled closure of the Sandow Mine, as the economic effects would be intertwined.

The primary tool used to estimate the economic effects of the proposed project was an input-output model (Jones 2002). Input-output models employ relationships among major economic sectors of a regional economy, such as the Milam, Lee, and Bastrop three-county area, together with imports and exports to and from the region, to characterize the region's economy and estimate the effects of change in one sector on the rest of the economy. The input-output model provides numerical multipliers that are used to determine the effect of changes in one industry's output on the regional output, income, value added to production, and employment within the region (Jones 2002). The model used for evaluation of impacts under the Proposed Action was the IMPLAN model for the State of Texas, maintained by Texas A&M University (Jones 2002).

3.10.2.1 Proposed Action

The social and economic values analysis is driven by employment at the proposed project and expenditures for labor, materials, and equipment. Several assumptions pertaining to these factors were required for the analysis. First, Alcoa has indicated that the existing Sandow Mine work force would be transferred essentially intact to the proposed Three Oaks Mine. There are currently 210 full-time employees at Sandow, 41 managerial and 169 operational. Over 68 percent of the Sandow employees live in Milam County; most of the remainder live in neighboring Williamson and Lee Counties. It was assumed that most of these workers would commute to the Three Oaks Mine rather than move. The few that would choose to move would be expected to do so gradually over a period of several years.

There also would be approximately 50 contract workers at the Three Oaks Mine during operations performing janitorial, security, and warehousing duties and providing reclamation assistance. The level of contract employment would be essentially constant during the life of the mine except for the reclamation work force, which would vary seasonally (Williams 2002). As with the full-time employees, there is currently a similar contingent of contract employees at Sandow that presumably would be available to fulfill these positions at the Three Oaks Mine.

There would be additional contract workers at the Three Oaks Mine for certain construction activities. Approximately 150 contract construction workers would be employed to work on public road and utility reroute construction and on building the ancillary facilities needed to support the mine such as roads, ponds, the conveyor system, the blending facility, office buildings, shops and warehouses, bridges, and dewatering and depressurization wells.

In addition to the stability of the work force, Alcoa has indicated that the annual lignite production rates at the Three Oaks Mine would be approximately the same as at the existing Sandow Mine. Therefore, the labor, equipment, and materials requirements should be similar for the two mines. The economic activity generated by the mines should be similar as well. However, the distribution of public fiscal impacts among counties in the study area would change with the change in location of the mine.

Population

The population of the study area would not be expected to change measurably as a result of developing the Three Oaks Mine. With employment levels remaining constant during the transition from Sandow to Three Oaks, there would be no impetus for population growth. There potentially would be a small, gradual shift of worker families from Milam County and outlying areas toward Lee and Bastrop Counties; however, the change likely would take place over several years as normal turnover would occur in the mine work force or as family circumstances and housing needs change.

Employment

It is anticipated that the Three Oaks Mine would not change employment or income patterns in the study area to a measurable degree. The only notable change would be 150 contract construction workers temporarily added at the beginning of the project for approximately 1 year. They would be expected to be contracted from the general area of the proposed mine, locally if possible, or from surrounding larger cities such as Austin. Temporary contract workers would not be expected to relocate to the study area. Those not living within daily commuting distance would likely reside in campground or motel facilities during the work week and commute to permanent homes on weekends. They would provide a modest, temporary increase in commercial activity and sales tax revenues in the study area; however, they would not have any on-going effect on the area population or economy.

Income

Income provided to the mine workers would follow the same trends as experienced at the Sandow Mine. As a result, the Three Oaks Mine would be expected to have essentially the same effect on study area income levels as the Sandow Mine with no change in existing conditions.

Public Finance

The Three Oaks Mine would be a substantial addition to the tax bases of certain public service jurisdictions where new mining operations would take place. These jurisdictions include Lee and Bastrop Counties and the Lexington, Elgin, and McDade ISDs. Property taxes would be collected by the jurisdiction in which the equipment and mine are located at the beginning of each year. As mining progresses, it would move into and out of the various jurisdictions such that property tax revenues from the minerals and mining equipment would not be the same in all years. Lexington ISD would be the largest beneficiary of Three Oaks Mine taxes, estimated at $24.5 million over the life of the mine. Elgin and McDade ISDs would receive LOM tax payments estimated at $13.5 million and $4.7 million, respectively. Lee County would receive tax revenues totaling $8.5 million, and Bastrop County would receive $7.5 million (Jones 2002).

The effect of the tax revenue increases on the five taxing jurisdictions would vary considerably. The projected average annual revenue would represent 58 percent of the total property taxes levied by Lexington ISD in 1998 and 38 percent of the 1998 total for McDade. In contrast, the increases would represent only 3 percent, 10 percent, and 12 percent, respectively, of the total property taxes levied by Bastrop County, Elgin ISD, and Lee County (Jones 2002).

The revenues would represent a substantial net addition to the tax bases of the five jurisdictions with minimal, if any, increases in the demand for public services. With little or no movement of new population into the jurisdictions, and a larger tax base, local county officials would have the option of either reducing the tax rate to raise the same total annual levy as in the past, or leave the tax rate unchanged and produce a larger budget. The situation would be different for the school districts, because under Texas school funding rules, the three districts would have their state financial support reduced by essentially the same amount as the tax revenue increases.

Sandow Mine related tax payments to the Thorndale ISD are currently down from previous levels because equipment, such as the dragline, is no longer located in the district. Current payments are based on underlying property values and would remain approximately the same until completion of the Three Oaks Mine conveyor system (partially in the district) would cause them to increase again.

Closure of the Sandow Mine would reduce tax revenues for Milam County and Rockdale ISDs as lignite production ceased in the districts and equipment was moved to the Three Oaks Mine. The net tax revenue reduction for Milam County would be expected to exceed $98,000 per year (estimated as an average since tax revenues have varied annually) (Jones 2002). There likely would be no corresponding reduction in demand for services as little or no population shift would be expected due to transfer of employees to the Three Oaks Mine. Although the school district would experience reductions in property tax revenues, it is expected that the reduction would be offset by an increase in state financial support to the schools.

Public Education and Housing

As noted above, no substantive population change would be expected from development of the Three Oaks Mine. As a result, there would be little or no change expected in the number of school children in any of the school districts in the study area. Similarly, there would be very little, if any, change in housing needs in the study area.

Property Values

The effects of the Three Oaks Mine on property values in the study area would vary over time. In the short term, it would be expected that residential property in close enough proximity to mining activity to see the disturbance area and hear the heavy equipment noise would be in less demand and therefore would experience a temporary decline in value. It would not be expected that there would be any effect on ranch land or farm property. As mining activity moves farther away from a given residential property and vegetation becomes re-established as part of the reclamation process, it would be expected that property demand and values would return to essentially the same levels as similar properties in the surrounding region. In the long term, the mine would be expected to have no effect or potentially could result in a modest increase in values, as much of the mine disturbance area would be permanent open space following the completion of mining. This estimate of long-term retention of property values is supported by a statistical study of property values near the Sandow Mine by Scout Land Services, which concluded that there was no relationship between property values and proximity to the mine (Fry 2001).

Other Public Services

There would be a shift in demand for emergency services in the study area with a small reduction in mine-related demand in Milam County and a modest increase in demand in Lee and Bastrop Counties. The effects would be minor as the small hospital in Rockdale still would be the closest to the mine after shifting production from Sandow to Three Oaks. More serious cases still would be sent to Austin or Temple. There also would be a shift in the ambulance or volunteer fire department that would respond to emergencies.

Potential impacts to groundwater wells from dewatering and depressurization pumpage are addressed in Section 3.2.3. Alcoa would be required to mitigate any mine-related impacts to groundwater wells.

Long-term Effects

Upon depletion of the economically recoverable lignite resource at the Three Oaks Mine at the end of the project life, mining would cease and reclamation would be completed. At that time, the social and economic effects of the project would cease or gradually decline.

Three Oaks Mine employment would cease, as would payment of wages and purchases of materials and equipment. This would result in the loss of 210 full-time jobs and 50 contract jobs plus “indirect” and “induced” jobs in local businesses that are supported by the economic activity provided by these “direct” jobs. Unless a new, cost-favorable energy source is identified, it is assumed that aluminum production would cease at the Rockdale smelter, which would result in the loss of an additional 1,400 jobs and approximately $250 million in annual expenditures (at current rates). See Section 3.10.2.2 for additional information on the effects of closing the smelter. It is assumed that power generation would continue as it is less sensitive to fuel costs.

The loss of substantial numbers of jobs would likely lead to emigration out of the area by much of the population supported by the jobs as they pursued alternative employment. Tax revenues to local jurisdictions would be reduced, as would the demand for local public services and facilities. Housing vacated by departing workers would change the local demand/supply ratio, tending to put downward pressure on housing prices. The actual dollar value of these effects would depend on what else was occurring in the local economy at the time of the closure, although continued growth in the study area would increase the base of population, employment and economic activity available to absorb the adverse effects of the closure.

3.10.2.2 No Action Alternative

Under the No Action Alternative, the Three Oaks Mine would not be developed. This alternative would include the scheduled closure of the Sandow Mine and the likely closure of the Alcoa’s aluminum smelter at Rockdale.

Lignite production from the Sandow Mine currently generates direct economic effects such as employment, wages, and purchases of equipment and materials. It also supports operation of the four power generating units and the Rockdale aluminum smelter by supplying low-cost energy. Alcoa has indicated that the local production of lignite is essential to the continued manufacturing of aluminum at a competitive price in the world aluminum commodity market. It is assumed, therefore, that if permits necessary for the construction and operation of the Three Oaks Mine are not approved, the Sandow Mine still would close as scheduled, due to the exhaustion of economically recoverable lignite, and the aluminum smelter also would close due to the loss of an economical energy source. The power generating units likely would continue to operate; however, they would shift to a more expensive energy source (e.g., western coal) which still would allow them to be competitive in the electric power market, though not for aluminum production (see Section 2.4).

The Alcoa smelter is a dominant factor in the manufacturing sector of the Milam, Lee, and Bastrop three-county area, accounting for almost 3.5 percent of the total 1997 employment in the three counties together (15.7 percent of Milam County's total). Closure of the Sandow Mine and smelter would cause substantial changes in the local economy. Approximately $250 million of annual expenditures and 1,400 jobs are currently attributable to the aluminum smelter. Lignite mining activities at the Sandow Mine currently add $72,292,000 in expenditures and 210 jobs. This total of $322 million annual expenditures and 1,610 jobs represents the potential direct losses to the area economy from closure of both the Sandow Mine and the aluminum smelter (Jones 2002).

In addition to the direct losses, there would be indirect and induced economic losses, which, together with the direct losses, would total an estimated $587 million annually and 3,276 jobs (Jones 2002). The job loss would equal approximately 8 percent of the total employment in Milam, Lee, and Bastrop Counties, which would raise the three-county unemployment rate to approximately 9.5 percent from the 2.8 percent level in 2000. Over two-thirds of the Sandow Mine workers live in Milam County. Assuming smelter workers follow a similar residential pattern, the direct losses would raise the number of unemployed in Milam County to 1,963 workers, almost 21 percent of the county labor force.

Closure of the Sandow Mine and smelter would lead to a loss of income for the three-county area estimated at almost $129 million annually (Jones 2002).

Due to the substantial loss of jobs and income in the study area, it is expected that closure of the Sandow Mine and aluminum smelter likely would lead to a large number of people leaving the area (especially in Milam County) in search of jobs. This also could result in a decline in property values with a substantial number of homes and apartments being put on the market; it is not possible to quantify the magnitude of this effect. Assuming a decline in property values would occur, county property tax revenues also would decline.

The social and economic impacts (including beneficial impacts) associated with the Proposed Action are described in Section 3.10.2.1. Under the No Action Alternative, these impacts would not occur, further compounding the effects associated with the closure of the Sandow Mine and aluminum smelter at Rockdale, as described above.

3.10.3 Cumulative Impacts

Effects of the past and present actions are included in the existing social and economic values environment for the study area (Section 3.10.1). Consequently, the cumulative effects of these activities and the Three Oaks Mine are addressed in Section 3.10.2.1 under the Proposed Action.

As discussed in Section 3.10.2.1, closure and reclamation of the Sandow Mine along with development of the Three Oaks Mine would likely increase employment slightly in the area over a period of approximately 5 years, during which time final reclamation would occur at Sandow and mine construction and start-up would occur at Three Oaks. It is assumed that the employment overlap would be small and would include mainly seasonal contract workers; accurate estimates of actual work force numbers are not available. There would be a small and beneficial effect to the local economy during this period.

Closure of the Sandow Mine is discussed in Section 3.10.2.2. The SAWS contract and groundwater withdrawal actions would not be expected to substantively affect social or economic values in the study area.

Future non-mine-related population growth in the study area (see **Table 3.10-2**) will result in an increase in tax revenues in the three counties and also will result in an increased demand for services. Cumulative effects will be minor as no population growth is expected from the Three Oaks Mine.

Planned non-mine-related transportation projects are not expected to cumulatively affect social or economic values. There is a potential for simultaneous construction of some of these projects and the proposed relocation/reconstruction of FM 696 and FM 619; however, the mine-related road construction would be of relatively small scale and should not conflict with the larger U.S. Highway 290 widening projects.

Neither of the Houston toad habitat conservation plan proposals would affect social or economic issues related to the Three Oaks Mine.

3.10.4 Monitoring and Mitigation Measures

No monitoring or mitigation measures are being considered for social and economic values.

3.10.5 Residual Adverse Effects

There would be no residual adverse effects associated with social and economic issues as a result of the Proposed Action.

3.11 Transportation

The principal transportation issues relate to changes in travel times due to local road relocations and public safety.

3.11.1 Affected Environment

The Three Oaks Mine area is served by a network of county roads (CRs) and farm-to-market (FM) roads under TxDOT jurisdiction connecting to major U.S. highways (see **Figure 1-3**). There is no existing or proposed rail service to the Three Oaks Mine. The county road pattern in the permit area is relatively sparse compared to surrounding areas. The permit area is bisected by FM 696, which connects with U.S. Highway 290 just outside of the permit area to the southwest, and with U.S. Highway 77, approximately 10 miles to the east. U.S. Highway 290 is one of the main routes between Austin and Houston. U.S. Highway 77 runs north through Rockdale to Waco and south through Giddings to Interstate 10 and Victoria. FM 619 intersects FM 696 about midway in the permit area and runs north-northwest approximately 17 miles to U.S. Highway 79 at Taylor. U.S. Highway 79 connects northern Austin with Bryan/College Station via U.S. Highway 190.

For purposes of this EIS analysis, the direct/indirect effects study area for transportation includes the permit area and FM 696 to its intersection with U.S. Highway 290. The cumulative effects area includes the study area in addition to FM 696 northeast to its intersection with U.S. Highway 77, to the extent that other planned activities in this area may generate traffic that would interact with Three Oaks Mine traffic.

Both FM 696 and FM 619 are two-lane, paved highways in fair to good condition. FM 696 follows a curvy route with numerous small dips and hills as it crosses a number of minor ephemeral and intermittent stream courses through the permit area and the surrounding study area. The paved surface is typically approximately 20 to 22 feet wide through the study area, except at the intersection of FM 619 with FM 696, where FM 696 has recently been widened to provide a center left-turn lane. Shoulders are typically narrow and minimally improved. FM 619 is less curvy and rolling than FM 696, but other relevant features are similar.

Level of Service (LOS) is a method of qualitatively measuring the operational conditions of traffic flows on roadways and the perception of those conditions by motorists and passengers (Transportation Research Board [TRB] 2000). LOS is rated “A” through “F”; “A” generally represents free-flowing traffic conditions with few restrictions, and “F” represents a “forced or breakdown” flow with queues forming and traffic volumes exceeding the theoretical capacity of the roadway (TRB 2000). Generally, level “E” represents traffic volumes at the capacity of the roadway.

Existing traffic flow conditions on FM 696 are somewhat restricted by lane geometry and road curvature. LOS on FM 696 during the morning and afternoon peak hours is estimated at a “B” level, which is generally good, although the lack of passing opportunities may make it seem worse at times if a string of cars queues up behind a slow-moving vehicle during the peak commuting hours. Traffic volumes on FM 696 averaged 2,158 vehicles per day in 2001, up 11 percent from 1999 counts (TxDOT 2001). Peak hour traffic volumes are estimated at approximately 10 percent of daily average traffic, based on recent counts taken for Alcoa at the FM 696/FM 619 intersection (Rowan 2000). Existing peak hour traffic is estimated at about 14 percent of roadway capacity.

Existing traffic conditions on FM 619, in and near the permit area, are estimated at LOS “A,” the most favorable level of service rating. Traffic volumes on that section of roadway averaged only 678 vehicle trips per day in 2001, and fewer than 50 vehicle trips during the peak hours. Notably, the daily volume is 44 percent higher than in 1999 (TxDOT 2001). Peak-hour traffic volumes are estimated at less than 3 percent of hourly roadway capacity.

County roads in the permit area are predominantly gravel or dirt surfaced and vary from an estimated 16 to 20 feet in width. Traffic levels on county roads are not generally available; however, Alcoa commissioned counts at the intersections of CR 303 and FM 619, CR 303 and CR 304, and CR 102 and FM 696. Counts were conducted over a 15-hour period from 5:00 a.m. to 8:00 p.m. The study counted 14 vehicle trips on CR 303, 48 trips on CR 304, and 38 trips on CR 102 (Rowan 2000). There is no established methodology for analyzing levels of service on gravel roads, but the counts are considered to be well within the capacity of the rural county roads.

3.11.2 Environmental Consequences

Transportation impacts are commonly evaluated relative to two criteria: compliance with applicable LOS planning standards and protection of safety conditions for the traveling public. For this project, there is an additional issue related to travel times through the study area due to a public perception and concern that roadway closures and reroutes would substantially increase travel distances.

The relevant LOS standard for evaluating traffic conditions near the Three Oaks Mine is the commonly used criterion for rural highways of LOS C during peak hour periods. At LOS C, traffic flows are in the stable range, but most drivers are becoming restricted in their freedom to select speed, change lanes, or pass other vehicles. Travel times are closely related to LOS as they are essentially a function of distance and speed, which is controlled by traffic flow conditions.

Use of “safety” is a less well-defined concept as an impact criterion. Many factors contribute to highway safety, including sight distances, road conditions, roadway geometry, and even weather conditions. Particular factors of interest are those that might be modified by development of a mining project, such as the mix of different types of vehicles in the traffic stream, availability of gaps in the dominant traffic flow to accommodate traffic entering the highway from a side road, and introduction of unusually large numbers of oversized vehicles.

3.11.2.1 Proposed Action

The Three Oaks Mine would employ an estimated 150 people during construction and 260 people during operation of the mine. The operations phase would generate the most traffic, including workers commuting to the site and deliveries of materials and supplies. (All lignite transport from the mine would be on the proposed transportation and utility corridor, isolated from public roads and traffic.) Observations at the Sandow Mine (Rowan 2000) indicate that traffic is spread throughout the day with a morning peak (in and out combined flow) equal to approximately half the total number of workers. Heavy truck traffic (i.e., deliveries) averages just under 1.5 vehicle trips per hour. Assuming that traffic patterns for the Three Oaks Mine would be similar to those associated with the Sandow Mine, project-related traffic would peak at approximately 195 trips (in and out combined) in the morning at the start of the day shift. Combining the project-related traffic with existing traffic would result in a total of approximately 420 vehicle trips during the peak hour on FM 696.

The increased traffic would be offset to some degree by substantial physical improvements to FM 696, including widening both the pavement and the shoulders, straightening, leveling, and adding exclusive left-turn lanes at major intersections. The modifications would upgrade the quality of the roadway to a “design speed” of 70 mph (as a safety factor) from the existing condition, which is the equivalent of a 30 mph “design speed” by current standards (Carter & Burgess 2001). The combination of traffic increases and roadway improvements would result in a LOS C rating on FM 696 in the study area.

Traffic increases on FM 619 are uncertain; however, any increase would be substantially less than on FM 696. Conservatively, assuming approximately one-fourth of the Three Oaks Mine traffic would use FM 619, peak hour traffic would increase to approximately 100 vehicle trips. The resulting LOS would be in the lower quarter of the B range, leaving substantial unused capacity on the road.

Highway safety effects of the Three Oaks Mine are difficult to predict. The segment of FM 696 that would be modified has experienced 22 accidents in the past 5 years, almost two-thirds of which resulted in injuries (Carter & Burgess 2000). The data suggest an increase over the years with 6 accidents in 1998 and 7 in 1999 compared with 2, 4, and 3, respectively, in 1995, 1996 and 1997 (Carter & Burgess 2000). However, there were no accidents in the first 5 months of 2000, so it is not clear whether the data represent a pattern or just a random series of events. In general, increased traffic without LOS improvement leads to an increase in accidents. However, the proposed roadway improvements would be expected to reduce accidents. In particular, the wider moving lanes and expanded, paved shoulders would provide much greater safety margins, and the substantially increased sight distances would reduce the likelihood of unsafe passes or traffic flow entering without sufficient space. While it is not possible to quantify the net effect, it is expected that the roadway improvements would offset any added risk from project-related traffic increases.

The effects of the Three Oaks Mine on travel times in the study area would be variable. There would be only temporary minor traffic delays due to construction, because most of the road construction activities would occur on new ROWs. The only effect on existing travel routes would occur when the new segments are tied into the existing network. Roadway reroutes would increase some travel distances and reduce others. The net effect on major routes would range from an increase of 1.1 miles to a decrease of 1.1 miles. At a speed of 50 mph, the travel time difference from a 1.1-mile distance change would be approximately 79 seconds; if speeds increase as a result of improved roadways, the time effect would be proportionately less.

During the first phase (i.e., temporary modifications) of road relocations, motorists traveling from FM 619 would save 0.1 mile if they were traveling westbound on FM 696 and 0.4 mile if traveling eastbound on FM 696. Trips from CR 90/89 would increase by 1.1 miles if connecting westbound on FM 696 and would increase by 0.5 mile if eastbound. Through-traffic on FM 696 would remain unchanged during the first phase. Motorists crossing the mine area on CR 102 would experience no change in travel distance during the first phase of operations.

The proposed permanent road reroutes would reduce the trip distance for motorists connecting from FM 619 to FM 696 westbound by 0.5 mile and eastbound by 1.1 mile. Travelers from CR 90/89 to westbound on FM 696 would have a 0.5-mile shorter route; those eastbound would have a 0.3-mile longer trip. Through-trips on FM 696 would increase by 0.5 mile. All trips utilizing FM 696 would likely benefit from increased travel speeds as a result of the physical improvements to the roadway.

Trips through the mine area on CR 102 would increase in distance by 0.5 to 1.0 mile as the road would be moved in stages from its current location to a new alignment on reclaimed land farther to the south. The relocation would occur in approximately 0.5-mile segments as each mine block was completed and new ROW on reclaimed land became available. The increase in travel distance would be partially offset by improvements in the quality of the roadway, including a wider cross-section and an improved travel surface. Trips from lower CR 102 to eastbound FM 696 would be reduced by approximately 1.0 mile as the new extension of CR 101 would provide a shorter route on a new and improved road alignment.

In the latter stages of the Three Oaks Mine, CR 304 would be rerouted a short distance to the northeast to avoid the new cut slopes at the northeast edge of the mine area. The change in length of the road and resulting travel time would be minor and would be offset by roadway improvements as noted above for CR 102.

Construction of the Three Oaks to Sandow transportation and utility corridor would cause temporary construction delays on Lee County roads CR 304, CR 306, and CR 312. The delays would be brief, and the roads would remain open. There would be no transportation impacts following installation of the corridor grade separators.

3.11.2.2 No Action Alternative

The No Action Alternative would result in no identified project-related impacts on transportation in the study area. Traffic volumes would not be affected, and there would be no Three Oaks Mine-related changes to the roads in the area, including the physical improvements to FM 696. The No Action Alternative would include closure of the aluminum smelter at Rockdale. This would result in a minor reduction in traffic levels on roads that currently provide access to the smelter and the Sandow Mine.

3.11.3 Cumulative Impacts

Transportation effects of the past and present actions in the study area are described in Section 3.11.1, Affected Environment. Consequently, the cumulative effects of these activities and the Three Oaks Mine are addressed under the Proposed Action.

Population growth in the cumulative effects area will increase traffic in the study area, primarily on the major highways, FM 619 and FM 696. TxDOT forecasts traffic on FM 619 of 500 trips per day in 2003 and 800 trips per day in 2023; traffic on FM 696 is projected to increase to 2,400 trips per day in 2003 and

3800 trips per day in 2023. These forecasts may be conservative, as traffic on FM 619 is apparently above the 2003 estimate at this time. Even with the projected population growth and the Three Oaks Mine, FM 619 would be expected to be at LOS B. As a result, the cumulative impacts to FM 619 would be minor. The LOS on FM 696 would drop into the LOS D category, however, from the cumulative impacts of the population growth and Three Oaks Mine. Though still functional and within the capacity of the roadway, a LOS D rating on a rural roadway could cause complaints from motorists and would likely trigger planning for improvements.

Cumulative impacts of the planned non-mine-related transportation projects and the Three Oaks Mine would be relatively minor. Widening of U.S. 290 may attract some additional traffic, some of which could use FM 696. However, there are few, if any, alternative routes available so major changes in traffic patterns are unlikely.

None of the other reasonably foreseeable future actions would be expected to affect transportation in the study area.

3.11.4 Monitoring and Mitigation Measures

Construction of proposed major improvements on FM 696 and FM 619, together with improvements to county roads in the permit area, would alleviate the adverse impacts of Three Oaks Mine-related traffic increases. No additional monitoring or mitigation measures are being considered.

3.11.5 Residual Adverse Effects

There would be a minor reduction in the LOS on FM 696 during the life of the Three Oaks Mine due to increased traffic; however, it would be offset by physical improvements to the roadway and would cease following mine closure and reclamation. As a result, there would be no residual adverse effects to transportation.

3.12 Noise and Visual Resources

Noise and visual resource issues relate to potential impacts from the proposed mine and ancillary facilities on sensitive human receptors in proximity to the proposed project. Potential impacts to other resources are addressed in wildlife (Section 3.5.2) and air quality (Section 3.8.2).

3.12.1 Affected Environment

3.12.1.1 Noise

The study area for potential direct noise effects from the Three Oaks Mine encompasses areas within 3 to 5 miles of the permit area. Noise effects from other land uses may cumulatively affect noise-sensitive receptors in the same area; generally this may include projects up to another 5 miles away, or a total of 8 to 10 miles from the permit area, depending on the nature of the project or activity.

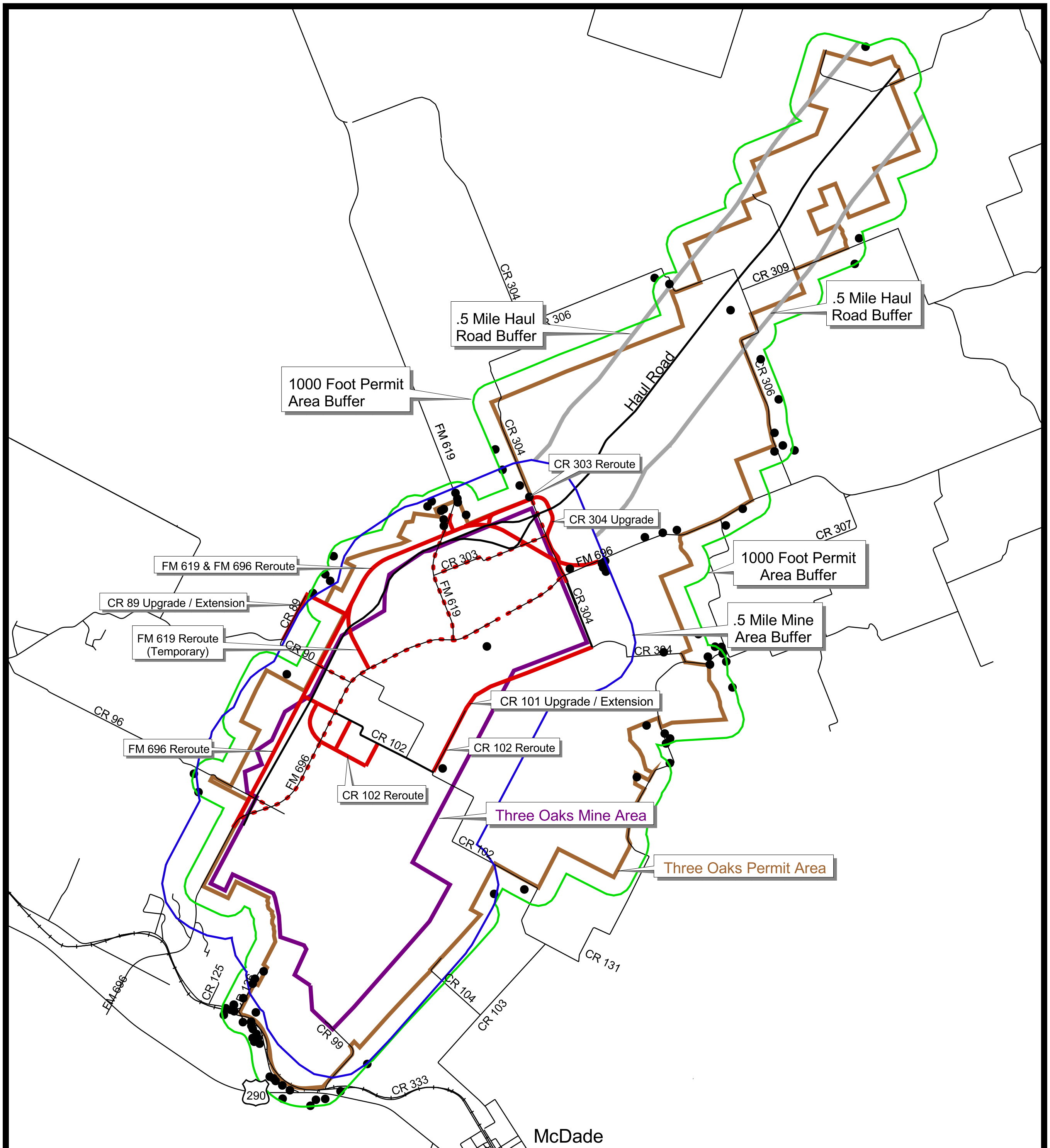
Describing the environment potentially affected by noise involves identifying noise-sensitive receptors and existing noise sources in the vicinity, characterizing terrain features that may affect noise transmission, and determining existing noise levels.

A baseline noise assessment was developed for the permit area using existing data for the region combined with sound measurements taken at selected receptors (Zephyr 2000). The resulting noise levels were compared with estimates prepared using USEPA, HUD, and FHWA techniques for selected areas.

Both HUD and USEPA consider average outdoor noise levels in excess of 65 decibels on the A-weighted scale (dBA) to be “normally unacceptable” for residential areas and other noise-sensitive land uses. Generally, all of the areas evaluated in and around the permit area are below that standard, with the possible exception of the U.S. Highway 290 corridor, where noise is dominated by high-speed traffic.

Noise-sensitive receptors in the study area are predominantly residences. There are approximately 125 residences within 1,000 feet of the mine permit area. Of those, the most sensitive are those closest to proposed high activity areas: 33 residences within 0.5 mile of the proposed mine disturbance area (9 of which are within the proposed disturbance area and would be removed), and an additional 11 residences within 0.5 mile of the proposed Three Oaks-to-Sandow haul road (see **Figure 3.12-1**).

The principal existing sources of noise in the study area are transportation corridors and the higher level of general human activity associated with population clusters in the communities of Butler and McDade. The most dominant source of noise is U.S. Highway 290, which carries an average of 13,416 vehicle trips per day (TxDOT 2000). Noise from U.S. Highway 290 traffic is perceivable as a background “drone” from as far as 2 miles away (Zephyr 2000). FM 696 carries 2,576 vehicle trips per day (TxDOT 2000), but at this level, traffic and the resultant noise are intermittent. Noise from other roads in the permit area is minor and sporadic due to much lower traffic volumes. Away from the human activity areas, noise emanates mainly from aircraft and from natural sounds, including wind, insects, birds, and domestic animals.



Legend

- Existing Roads
- Road Relocations
- Residence
- .5 Mile Mine Area Buffer
- .5 Mile Haul Road Buffer
- 1000 Foot Permit Area Buffer

Source: Adapted from Alcoa 2001c.

N

0 2000 4000 Feet

Three Oaks Mine

Figure 3.12-1
Existing Occupied Residences Not Owned or Controlled by Alcoa or CPS

Terrain in the study area typically is flat to gently rolling, with elevations generally ranging from under 400 feet to 500 feet NGVD. The high point in the area is the Yegua Knobbs at 753 feet NGVD, just outside the permit area to the east. Terrain effects on noise transmission are expected to be highly localized, due to the lack of major terrain features in the area. There may be some noise buffering from vegetation where there are extensive woodland lots, although they, too, would be specific to a local area and to local climatic conditions.

Estimates of existing noise levels for the study area were developed based on a combination of daytime field measurements, modeling techniques, and estimation methods (Zephyr 2000). The estimates were prepared for 10 locations in and near the permit area (**Figure 3.12-2**). They included a daytime average level, a nighttime average level, and a day-night average level for each receptor location. The noise estimates are illustrated in **Table 3.12-1**. Day-night average noise levels (L_{dn}) for the 10 receptor areas range from 43 dBA in the most rural parts of the area to 51 dBA in the area adjacent to FM 696. Most of the permit area is estimated to have L_{dn} in the 44 to 45 dBA range. Locations near U.S. Highway 290 are likely to experience noise levels higher than any of the 10 receptor locations evaluated in the study. Day-night average levels at 1,000 feet from U.S. 290 are estimated at 60 dBA, dropping to approximately 54 dBA at 2,500 feet from the highway.

Table 3.12-1
Existing Noise Levels at Selected Noise Sensitive Receptors

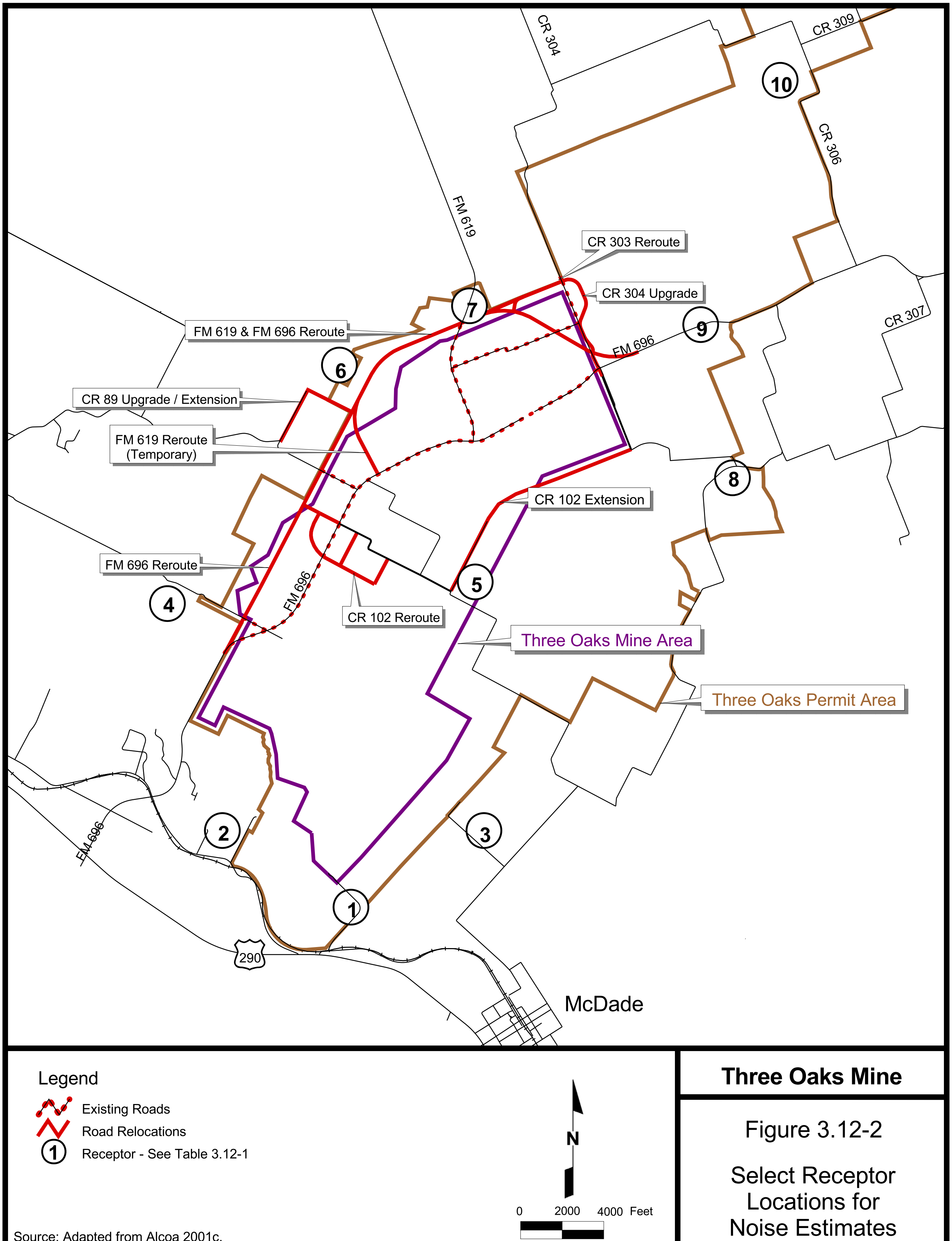
Receptors		Estimated Average Noise Level (dBA)		
No.	**Description**	**Daytime (L_d)**	**Nighttime (L_n)**	**Day-Night (L_{dn})**
1	Three Oaks Cemetery	51	37	49
2	Seventh Day Adventist Church	49	37	48
3	Star Ranch	44	37	45
4	Raymond Ott residence	43	37	45
5	A. H. French residence	41	37	44
6	Alcoa (formerly J. Bass residence)	40	37	44
7	Weldon Clark residence	39	37	44
8	Glen Bostic life estate	38	37	44
9	Julius Bostic residence	53	37	51
10	John Komandosky residence	37	37	43

Source: Hodges 2001, 2002.

3.12.1.2 Visual Resources

Potential visual effects of a proposed project typically are evaluated based on a combination of the quality of the existing landscape and the sensitivity of likely viewers to visual change. An additional factor is the capacity of the characteristic landscape to absorb visual changes.

Visual quality is somewhat subjective and dependent on context. A small, tree-lined lake would have greater visual importance in the dry prairies of the Texas Panhandle, for example, than in the Piney Woods region of east Texas. In an effort to minimize the subjectivity and ensure that the results of an analysis for a given landscape are likely to be similar, even when performed by different visual analysts, federal land management agencies developed standardized techniques for visual analysis (BLM 1986; USFS 1995).



Three Oaks Mine

Figure 3.12-2

Select Receptor Locations for Noise Estimates

6/19/02

While not directly applicable to private lands such as those in the vicinity of the Three Oaks Mine, these visual resource management systems provided guidance on the approach used for this analysis.

In general terms, visual quality is a function of scenic attractiveness, variety, and uniqueness of the characteristic landscape. A landscape with greater variety in landform, linear features, color, or vegetation type is considered to be higher in quality than one with little variety. A landscape that is similar in character to a large portion of the surrounding lands is of lesser quality than one with unique, attractive features.

Visual sensitivity is generally a function of the number of people that will view a landscape, the duration of their views, their proximity to the landscape, and the reason they are in a position to observe the views. For example, a tourist stopping for a leisurely lunch at a scenic overlook is considered to be more sensitive than a commuter racing by the same spot on his/her way to work. A viewpoint hosting 1,000 visitors per day throughout the summer and fall is considered more sensitive than one visited by just a few people on occasional holiday weekends. Viewers within 0.5 mile of a particular landscape are considered to be more sensitive to visual effects than viewers several miles away.

For purposes of analysis, the visual resources study area for the Three Oaks Mine is considered to be the viewshed of the mine area, or the area from which mine-related disturbance would be visible. The cumulative effects area includes the mine area viewshed plus an area up to 3 miles beyond the permit area that would be visible from common viewpoints.

The visual study area is a Post Oak Savannah landscape typical of much of the surrounding region. Much of the area is pastureland with several sizable wooded areas and wooded drainage bottoms. There is very little, if any, cultivated cropland in the study area, although some hay is harvested. Development is sparse with only 125 residences in, and within 1,000 feet of, the approximately 16,062-acre permit area. Most of the residences are in clusters just outside the permit area; only nine are located within the mine disturbance area. The visual quality of the landscape is considered to be typical of the region, not unattractive, but lacking distinctive topographic or vegetative features that would make it unique. Growth in the area has been slow; the number of residences has increased at a rate of 1.0 percent per year since 1983. While the new residences have increased the level of development, the low rate of change and overall increase of only 19 residences (one per 840 acres of the permit area) have had only minor effects on the visual character of the study area.

Sensitive viewpoints in the study area include the 125 residences and public roadways in and through the area. Most of the residences are considered to be moderately sensitive with fairly high interest in the landscape, mitigated by distance from the proposed mine disturbance area. Approximately 33 residences are in the foreground of the proposed mine area (within 0.5 mile). Nine of the 33 would be removed for mining, leaving 24 considered to have a higher level of sensitivity to visual effects. Approximately 17 of the 24 have existing vegetative screening between them and the proposed mine disturbance area.

The most sensitive roadways through the area are FM 696 and FM 619 because of the traffic volumes they carry. The level of interest in the landscape for most motorists is considered relatively low, however, based on the lack of recreational opportunities for most travelers. The resultant level of sensitivity is considered to be moderate. Sensitivity of viewpoints from county roads in the study area is considered to be low, based on the extremely low traffic volumes they carry.

The only additional visually sensitive areas that have been identified in the study area are three cemeteries, one affiliated with the Knobbs Baptist Church. The visual sensitivity of the cemeteries is considered to be low to moderate because the frequency of visitation is low.

3.12.2 Environmental Consequences

3.12.2.1 Proposed Action

Noise

Noise impacts are commonly evaluated according to two general criteria: 1) the extent to which a project would exceed federal, state, or local noise regulations; and 2) the estimated degree of disturbance to people.

There are no specific federal, state, or local noise regulations that govern the proposed Three Oaks Mine. Neither the State of Texas nor Bastrop or Lee Counties have noise regulations governing mining operations. HUD has developed standards for use in evaluating activities under its jurisdiction. Although HUD does not have regulatory authority over the Three Oaks Mine, the standard is instructive as a guide to human disturbance. The HUD standard for “acceptable” noise levels in residential areas is a L_{dn} of 65 dBA (HUD 1984). For comparison, the TxDOT recommends an equivalent continuous sound level (L_{eq}) standard of 65 dBA (TxDOT 1997).

Other agencies and cities have differing standards, some less stringent, some more rigorous. Without specific legislative guidance, the degree of disturbance becomes the key factor in evaluating noise effects, with a focus, in this case, on residents near the proposed project. The concept of human disturbance is known to vary with a number of interrelated factors, including changes in noise levels; the presence of other, non-project-related noise sources in the vicinity; peoples' attitudes toward the project; the number of people exposed; the type of human activity affected (e.g., sleep or quiet conversation as compared to physical work or active recreation); wind direction; and buffering features. Consequently, it is helpful to refer to the HUD standard as a quantitative measure of likely disturbance.

As noted in Section 3.12.1.1, the principal noise-sensitive receptors near the Three Oaks Mine are residences. **Table 3.12-2** identifies the distances from each of the three nearest residences to the major activity areas of the proposed mine for each of the time periods identified in the mine plan.

The potential noise effects of the proposed Three Oaks Mine are complex due to the large disturbance area, the anticipated 25-year life of the mine, the variety of noise-generating activities, and the mobility of the noise sources. This analysis addresses construction noise and operations noise separately, although there would be some overlap in timing between the two categories. Construction activities would include two major types: 1) road construction, including both public roads and the mine haul road and 2) construction of ancillary facilities, including mine offices, shops and maintenance facilities. Operations activities would

Table 3.12-2
Noise-sensitive Residences Nearest the Proposed Three Oaks Mine Activity Areas[1]

	Distance from Major Activity Area to the Three Nearest Residences (feet)		
Component/Project Year	**Nearest Residence**	**Second Nearest Residence**	**Third Nearest Residence**
Mining Activities			
1	700	800	875
2	2,000	2,100	2,250
3	2,700	2,800	2,875
4	2,750	2,750	3,075
5	2,425	3,325	3,375
6-10	900[2]	2,000	2,500
11-15	300[2,3]	1,625	1,750
16-20	300[2,3]	875	2,000
21-25	300[2,3]	1,625	2,750
Ancillary Facilities			
All	1,200	1,000	1,500
Transportation/Utility Corridor			
All	625	860	1,750

[1]Residences peripheral to the mine area that are not owned or controlled by Alcoa or CPS.
[2]Residences on privately owned in-holdings within the mine area.
[3]Mining not permitted within 300 feet of an occupied residence.

include mine-related clearing, grubbing, and topsoil removal; overburden and interburden removal; lignite mining and transport; and reclamation.

Construction of the maintenance, fueling, washing, storage, and office facilities would be similar to that of a typical commercial or industrial facility. Equipment required for construction of these ancillary facilities and the associated sound levels is presented in **Table 3.12.-3**. Applying daily usage factors for each type of equipment, the equivalent combined sound level during the noisiest period of construction was estimated to be 87 dBA at 50 feet from the center of the activity.

Construction of haul roads, pit access roads, and public roadway rerouting would occur throughout much of the project duration. Prior to mining activities and construction of the office and shop facilities, both the main haul road and the reroute of FM 619, with grade separators, would occur along the western side of the permit area. Anticipated typical road construction equipment with their sound levels and usage factors are presented in **Table 3.12-4**. The equivalent sound level emitted by road construction was estimated to be 84 dBA at 50 feet from the center of activity.

A maximum scenario for ambient environmental noise caused by construction activities would be the simultaneous construction of the haul road and the new offices and shop facilities. Although plans also call for rerouting FM 619, its construction should be completed prior to the offices being built. The closest residences to the potential impact area for this scenario are those in the Willow Creek subdivision. The nearest residence would be approximately 2,250 feet from the proposed haul road location and 1,200 feet from the offices. Conservatively estimating the combined L_{eq} from both of these construction activities, using sound attenuation due to distance only, the maximum noise level at the nearest residence would be 60 dBA.

Table 3.12-3
Ancillary Facility Construction Equipment Sound Levels

Equipment	Sound Level (dBA)	Quantity	Usage Factor[1]
Front loaders	79	1	0.30
Backhoes	82	1	0.26
Bulldozers	80	2	0.40
Scrapers/graders	85	1	0.08
Dump truck	81	2	0.40
Pavers	89	1	0.10
Concrete mixers	82	1	0.10
Concrete pumps	83	1	0.10
Cranes	85	1	0.10
Pumps	76	2	0.40
Generators	78	1	0.40
Compressors	81	1	0.30
Pneumatic tools	86	1	0.05
Saws	78	1	0.04
Vibrators	76	1	0.10
Equivalent combined sound level[2] at 50 feet	87		

[1]Usage factors represent the fraction of time in a 24-hour day the equipment would be operating at the indicated sound level.
[2]Adjusted for usage factors.

Source: Adapted from Zephyr 2001.

Table 3.12-4
Typical Haul Road Construction Equipment Sound Levels

Equipment	Sound Level (dBA)	Quantity	Usage Factor[1]
Scrapers (657)	85	1	0.25
Compactors	76	1	0.15
Graders	85	1	0.24
Gravel truck	81	2	0.12
Water truck	83	1	0.16
Backhoes	82	1	0.16
Equivalent combined sound level[2] at 50 feet	84		

[1]Usage factors represent the fraction of time in a 24-hour day the equipment would be operating at the indicated sound level.
[2]Adjusted for usage factors.

Source: Adapted from Zephyr 2001.

It is assumed these construction activities would be limited to daytime hours. Consequently, the minimum background, nighttime, noise level of 37 dBA (Zephyr 2001) was used with the 60 dBA project-related noise estimate to calculate the maximum L_{dn}, which was 58 dBA. This level would be below the HUD standard for acceptable outdoor noise at a residence. Considering potential attenuation effects of buffering features, actual noise effects could be lower.

Noise effects from haul road construction alone also were calculated for the nearest residences not affected by ancillary facilities construction. L_{dn} were 60 dBA and 59 dBA, respectively, for the two nearest residences. The calculated sound levels for selected receptors are summarized in **Table 3.12-5**.

Table 3.12-5
Construction Noise Effects on Nearby Residences

Project Component/ Residence[1]	Distance to Nearest Noise Source (feet)	Potential Construction Activities	L_{eq}[2] (dBA)	L_n (dBA)	L_{dn}[3] (dBA)
Ancillary facilities – nearest residence	1,200	Haul road and ancillary facilities	60	37	58
Transportation/utility corridor – nearest residence	625	Haul road	62	37	60
Transportation/utility corridor – second nearest residence	725	Haul road	61	37	59

[1]See **Table 3.12-2**.
[2]L_{eq} resulting from the construction activity was assumed to represent day average sound level (L_d) for purposes of calculating L_{dn} at the residence.
[3]The L_{dn} represents a combination of L_d with night average sound level (L_n) employing a 10db penalty on L_n because of the increased sensitivity of people during normal sleeping time.

Based on these estimates, the maximum construction sound levels would meet the HUD standard at existing nearby residences. The current 1,200-foot separation from the ancillary facilities construction area to the nearest residence is sufficient to meet the standard. The minimum distance needed from road construction alone would be approximately 354 feet.

Despite the standard, USEPA studies have shown that an increase of 10 dBA over the existing background noise levels has commonly caused nearby receptors to vigorously complain (USEPA 1974). Construction activities would exceed the USEPA threshold. However, construction activities at the Three Oaks Mine would be temporary and only would occur during daytime hours, both of which should moderate local concerns to some degree.

Operation of the Three Oaks Mine would generate noise from four major categories of activity: 1) clearing, grubbing, and topsoil removal; 2) removal of overburden and interburden; 3) mining and transport of lignite; and 4) reclamation of areas disturbed by project activities. These activities could occur simultaneously but generally would be spread out over the active mining area. Essentially all of the noise produced by these activities would result from operating heavy construction and earth-moving machinery. The equipment proposed for use at the Three Oaks Mine would be similar or identical to the equipment currently used at Alcoa's Sandow Mine, and much of the noise emissions data used in this analysis derive from measurements of noise from operating equipment at Sandow (Zephyr 2001).

Prior to overburden removal, the area to be mined would be stripped of rocks, trees, existing road material, and other surface obstacles. This clearing and grubbing activity would be accomplished with bulldozers, shovels, and trucks in each of the separate mining areas. If prime farmland soil is to be disturbed, topsoil would be salvaged and placed in separate stockpiles. Clearing and grubbing moves fairly rapidly, but it would continue sporadically throughout most of the mining process, progressing just ahead of overburden removal. These activities would be limited to daytime hours. The major noise-producing equipment that would be used in clearing and grubbing is listed in **Table 3.12-6**. The L_{eq} contribution at 50 feet from the center of activity as a result of the simultaneous use of a group of this equipment, adjusted for the usage factor, was estimated to be 77 dBA.

Table 3.12-6
Clearing and Grubbing Equipment Sound Levels

Equipment	Sound Level (dBA)	Quantity	Usage Factor[1]
Bulldozer	82	1	0.34
Equivalent combined sound level[2] at 50 feet	77		

[1]Usage factors represent the fraction of time in a 24-hour day the equipment would be operating at the indicated sound level.
[2]Adjusted for usage factors.

Source: Adapted from Zephyr 2001.

As the mine pit advances, overburden materials covering the lignite seams and interburden between the seams would be removed and placed in the previously mined pit. Overburden and interburden would be removed with the use of at least one, and sometimes two, 102-cubic-yard, electric walking-type draglines in each mine pit area. On rare occasions, there may be two draglines operating in the same pit or two draglines operating in adjacent pits in fairly close proximity. The draglines are currently in operation at the Sandow Mine. Each dragline would be supported by one bulldozer. The draglines would operate 24 hours a day, 7 days a week, except during personnel break times and times when a dragline would be walked to a new location. For the initial pit, overburden material would be placed on the back edge of the pit. On subsequent passes, the material would be backfilled into the mined out pit.

Where overburden is relatively shallow, Alcoa may use mobile equipment for overburden removal in place of one of the draglines. In such cases, one dragline may operate in one pit area while the mobile equipment would operate in another. Overburden removal using mobile equipment most likely would employ five haul trucks and a (Hitachi) diesel powered mining shovel.

Noise emission estimates for overburden removal are presented in **Table 3.12-7** for the dragline and for mobile equipment. The maximum equivalent noise level at 50 feet from the center of the overburden removal was estimated to be 90 dBA when using the dragline. The mobile equipment would produce a slightly lower equivalent noise level of 89 dBA.

Noise effects of overburden removal are expected to be the worst during the first year of operation as the heavy equipment would be at ground level and closest to a number of homes in fairly close proximity to the proposed pit. In addition, there would be times when the overburden removal activity would be close to other project-related noise sources such as road building and ancillary facilities construction. In subsequent years, the overburden stripping gradually would move farther into the mine disturbance area and would sometimes be below grade, in a pit, which would provide increasing noise barrier benefits as the pit deepens. There also is a potential for two residences to be very near mining and overburden removal activities in later years

Table 3.12-7
Overburden Removal Equipment Sound Levels

Equipment	Sound Level (dBA)	Quantity	Usage Factor[1]
Dragline Overburden Removal			
Dragline	90	1	0.87
Bulldozer	82	1	0.83
Equivalent sound level[2] at 50 feet	90		
Mobile Equipment Overburden Removal			
Diesel shovel	83	1	0.94
Haul trucks	84	5	0.55
Equivalent combined sound level[2] at 50 feet	89		

[1]Usage factors represent the fraction of time in a 24-hour day the equipment would be operating at the indicated sound level.
[2]Adjusted for usage factors.

Source: Adapted from Zephyr 2001.

(see **Table 3.12-2** years 6 through 25) as there are two properties partially within the proposed mine disturbance area that are not controlled by Alcoa or CPS.

Once the lignite seam is exposed, it would be mined by large backhoes and transported by haul truck to a stockpile, a new conveyor loading facility at the Three Oaks Mine, or the existing Sandow Mine coal handling facilities via the proposed transportation and utility corridor, for conveyor delivery to the Rockdale generating station. The equipment sound levels associated with these distinct and separate activities are listed in **Table 3.12-8**.

Use of a conveyor system as the main lignite transport method, rather than haul trucks, is being evaluated by Alcoa. The conveyor system, if used in place of haul trucks for transport of lignite to the existing power generating station, would operate along the transportation and utility corridor, generally on an around-the-clock basis. Noise emissions for the conveyor system are presented in **Table 3.12-8**. The L_{eq} contribution at 50 feet from the center of activity as a result of the use of this equipment was estimated to be 73 dBA based on data from the Sandow Mine conveyor adjusted for an assumed usage factor of 0.74 (Hodges 2002c). The available measurements included the crusher used to prepare the lignite for transport on the conveyor; however, the crusher would be present only at the loading point of the conveyor, so the noise estimates are conservative for most of the corridor.

The usage factors presented in **Table 3.12-8** reflect the duration that a receptor would experience increased noise levels if the mining activity was nearby. Exposure to haul trucks and water trucks traveling the haul road would occur intermittently, but quite consistently. Mining and transporting 7 million tons of lignite per year would generate an average of 120, 160-ton loads per day, or 240 one-way truck trips, 365 days per year. At the maximum production of 8 million tons per year, the mine would generate 137, 160-ton loads per day, or 274 one-way truck trips.

Spoil and overburden piles left after mining would be leveled and graded or would be used for reclamation of mined areas (Section 2.5.3). All disturbed areas would be reclaimed, stabilized with vegetation, and

Table 3.12-8
Lignite Mining and Transport Equipment Sound Levels

Equipment	Sound Level (dBA)	Quantity	Usage Factor[1]
Lignite Mining			
Diesel shovel	83	1	0.85
Bulldozers	82	1	0.22
Haul trucks	84	3	0.55
Equivalent combined sound level[2] at 50 feet	88		
Coal Stockpile Loading			
Backhoes	82	2	0.08
Haul trucks	84	2	0.06
Bulldozers	82	1	0.04
Equivalent combined sound level[2] at 50 feet	78		
Haul Road Traffic[3] (Transportation and Utility Corridor)			
Long Haul Trucks	85	1	0.200
Water Trucks	82	1	0.067
Equivalent combined sound level[2] at 50 feet	79		
Crusher/Conveyor[3] (Transportation and Utility Corridor)			
Crusher and conveyor	74	1	0.74
Equivalent combined sound level[2] at 50 feet	73		

Source: Adapted from Zephyr 2001.

[1]Usage factors represent the fraction of time in a 24-hour day the equipment would be operating at the indicated sound level.
[2]Adjusted for usage factors.
[3]Either haul trucks or a crusher/conveyor system would be used for transport of lignite to the existing generating station.

maintained. Once the initial pit is mined, reclamation would be initiated and would continue throughout the life of the mine. The initial phase of reclamation would be completed within approximately 1 year after mining of a pit is completed. Typical major noise-producing equipment and related sound levels for reclamation are listed in **Table 3.12-9**.

Table 3.12-9
Reclamation Equipment Sound Levels

Equipment	Sound Level (dBA)	Quantity	Usage Factor[1]
Scraper	85	1	0.15
Bulldozers	82	1	0.60
Equivalent combined sound level[2] at 50 feet	82		

[1]Usage factors represent the fraction of time in a 24-hour day the equipment would be operating at the indicated sound level.
[2]Adjusted for usage factors.

Source: Adapted from Zephyr 2001.

Noise from the proposed Three Oaks Mine progressively would emanate from the entire mine disturbance area over the 25-year life of the mine. There are approximately 10 residences within this area. However, 8 of the 10 residences are owned by Alcoa or CPS, and it is assumed they would be vacated and removed prior to mining, thus eliminating them from concern as noise-sensitive receptors. The remaining two residences are located on privately owned in-holdings and would be considered sensitive receptors as mining activity approached them in the later years of the project. One or the other of these two residences would be the nearest residence to major mining activity in years 6 through 25 of the project (**Table 3.12-2**). There also are several privately owned residences in the permit area along the route of the transportation corridor, and there are numerous residences outside the permit area surrounding the mine area. These latter units tend to be located in clusters. There is a cluster of homes near FM 619 and another in the Willow Creek subdivision, both near the northwest edge of the mine area. There also is a cluster near the intersection of Smith Road (CR 126) and Old McDade Road south of the mine area. Finally, there is a more dispersed cluster of residences south of the Knobbs, just over 1 mile east of the northeast corner of the mine area. The nearest of the residences are itemized in **Table 3.12-2** and illustrated in **Figure 3.12-1**.

It is expected that maximum noise effects would occur when the main equipment groups are operating simultaneously, in close proximity to each other, and also in close proximity to noise-sensitive receptors (residences). Under the proposed operating plan, a potential maximum noise scenario would occur during year 1, in which clearing and grubbing, overburden removal with a dragline, mining, lignite stockpile loading, and haul road traffic could occur simultaneously in close proximity to one another and near the permit boundary. The resulting noise level at the nearest residence (in the FM 619 vicinity) would be 67 dBA (L_{eq}) and the L_{dn} would be 73 dBA, well in excess of the 65 dBA HUD standard. The 67 dBA would continue through the night due to around-the-clock overburden removal, mining, and lignite hauling. The resulting noise level would exceed the estimated 37 dBA night background level by 30 dBA.

Another potential maximum noise situation could occur if both draglines would be in the same or adjacent mining areas and could be at their closest points to the same receptors. This could occur in year 1 with two draglines operating on opposite sides of FM 619 and thus near residences in that area. The resulting estimated noise levels at the nearest residence would be 66 dBA (L_{eq}) and 72 dBA (L_{dn}), above the HUD standard and well above the nighttime ambient background levels. This scenario would be uncommon at other times during the life of the mine due to the greater separation from sensitive receptors and generally greater distances between yearly activity areas in the A and B mine blocks.

Given that the maximum noise scenarios could happen at certain times, the more likely scenario for most of the Three Oaks Mine project life would be for one or two major noise-generating activities to occur at any particular time and location. **Table 3.12-10** illustrates the estimated distance from each major source required to achieve an L_{eq} of 65 dBA and an L_{dn} of 65 dBA. It also shows the distance required to reduce the sound level to 47 dBA, 10 dBA above the ambient nighttime background level for most of the study area, which the USEPA has identified as a level of disturbance triggering compliants (Zephyr 2001). These latter distances (to 47 dBA) are maximums and are likely overstated to some degree because, as the distances increase, the effects of atmospheric absorption become more of a factor, and the likelihood of additional attenuation from vegetation, topography, and other factors also increases.

Table 3.12-10 also presents the estimated distance required from the alternate crusher/conveyor system to achieve an L_{eq} of 65 dBA, an L_{dn} of 65 dBA, and an L_{eq} of 47 dBA. As shown, it is estimated that the conveyor would be quieter than truck haulage, but both modes would meet the HUD 65 dBA (L_{dn}) standard at all residences along the corridor. Data are not available regarding whether the conveyor emits pure tonal sound.

Table 3.12-10
Distance to Threshold Noise Levels for Major Noise Sources

Activity	L_{eq} at 50 Feet	L_{dn} at 50 Feet[1]	Distance in Feet to L_{eq} = 65 dBA	Distance in Feet to L_{dn} = 65 dBA	Distance in Feet to L_{eq} = 47 dBA[2]
Construction					
Ancillary facilities	87	85	629	500	5,000
Road construction	84	82	446	354	3,540
Operations					
Clearing & grubbing	77	75	199	158	1,581
Overburden – dragline[3]	90	96[4]	889	1,774[4]	7,063
Overburden – mobile[3]	89	95[4]	792	1,581[4]	6,295
Lignite mining[3]	88	94[4]	706	1,409[4]	5,610
Stockpile loading	78	76	223	177	1,774
Haul road traffic[3,5]	79	85[4]	251	500[4]	1,991
Crusher and conveyor[3,5]	73	79[4]	126	251[4]	998
Reclamation	82	80	354	281	2,812

[1]The L_{dn} calculation penalizes nighttime noise. Consequently 24-hour operations produce increased L_{dn} levels while daytime only operations typically produce lower L_{dn} levels due to substantially lower nighttime noise levels.
[2]Project-related noise only; not combined with background.
[3]Activity operates 24 hours per day; all others are daytime only.
[4]Assumes background level of 37 dBA (Zephyr 2001).
[5]Either haul trucks or a crusher/conveyor system would be used for transport of lignite to the existing power station.

It should be noted that noise levels are measured on a logarithmic scale, so if two or more of these noise source activities were operating in close proximity at the same time, the noise levels could not simply be added together. For example, if the dragline overburden removal, at 90 dBA, and lignite mining, at 88 dBA, were operating close together, the combined noise level on the logarithmic scale would be approximately 92 dBA.

Comparing **Table 3.12-10** and **Table 3.12-2**, it is apparent that only a few privately owned residences would be affected by noise levels above L_{dn} 65 dBA, unless multiple major noise sources were operating simultaneously in close proximity. For example, no residences would experience L_{eq} noise levels above 65 dBA as a result of construction of the ancillary facilities. The dragline is estimated to produce L_{dn} levels above 65 dBA at three or more residences at times in year 1, but at no residences in year 2. The two residences on private in-holdings are exceptions (**Table 3.12-2**); one could experience L_{dn} levels above 65 dBA during parts of years 6 through 25, and the other could experience such levels during parts of years 16 through 25.

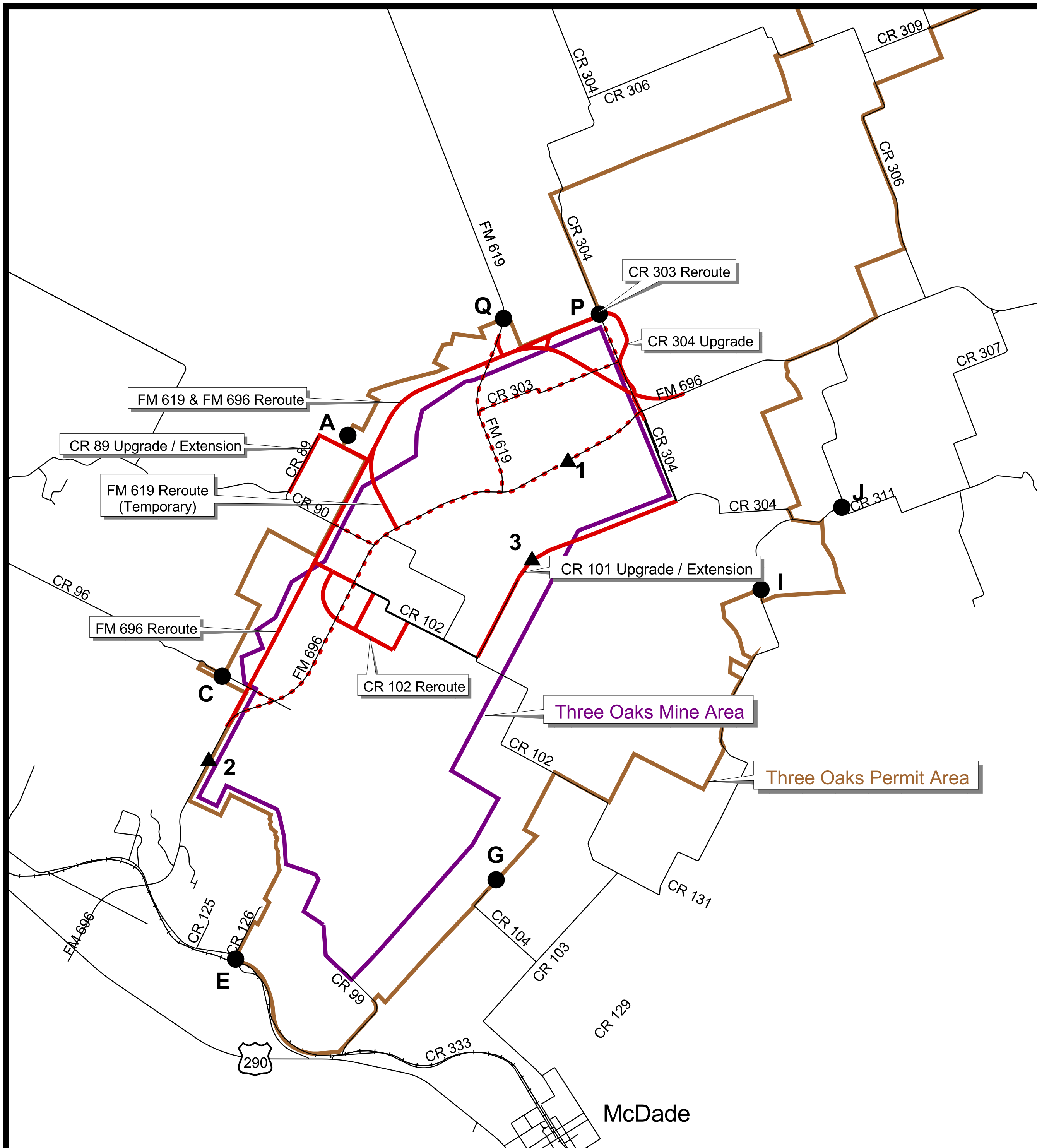
In addition to the raw numbers, a number of factors that are unquantifiable at this time would influence the effects of Three Oaks Mine noise on nearby residences. Importantly, the lignite mining process is highly dynamic. Most major noise-generating activities are mobile, generally moving through a given area fairly rapidly. The draglines move more slowly, although they, too, work their way steadily through a given area. Though slower moving than most of the mining equipment, they are not stagnant sources of noise. Considering the distances involved, the highest noise levels would move away from a sensitive receptor within a few weeks or months, at most. Also, overburden removal and mining would, in some cases, progressively work lower into pit areas, effectively creating their own noise barriers over a period of time. Depending on the location of overburden and spoil piles, these also might function as noise barriers. In contrast, the draglines, measured in operation at Sandow, have demonstrated pure tones with harmonic components in their noise signatures at frequencies of 206.25 Hertz (Hz), 412.5 Hz, 618.75 Hz, and 825.0 Hz (Vibra-Tech 2001). Pure tones are single frequency sounds that stand out above the base sound level for the source; in the case of the dragline, the pure tone components exceed the base level by 10 to 20 dB (Vibra-Tech 2001). Pure tones tend to increase the annoyance factor for listeners, possibly due to their constancy (Harris 1979). Supporting this concern, the Vibra-Tech study (2001) was conducted because of complaints from a homeowner approximately 3 miles from the operating dragline. The monitoring results indicated overall noise levels were very low, but the tonal components were nevertheless measurable and apparently sufficiently annoying to provoke a complaint from this one homeowner (Vibra-Tech 2001).

In summary, although the HUD standard is a guideline and not enforceable, there are a few instances where individual project-related noise sources would exceed the HUD 65 dBA (L_{dn}) standard at sensitive receptors in the study area. The standard also would be exceeded if several sources were to operate simultaneously in close proximity to a residence. Exceedences would likely continue for periods ranging from a few days to a few months at a single location. Of equal or greater concern is the fact that the draglines, some of the loudest sources, would operate during nighttime hours, and they exhibit pure tonal qualities in their noise emissions. Pure tones are known to cause community annoyance when they stand out above base noise levels (Harris 1979). Also, although the projected exceedences above the HUD standard would be relatively few, the projected noise levels would be well above existing ambient background levels. The USEPA has concluded that sound level increases greater than 10 dBA often cause nearby community members to take vigorous action to oppose the presence of the noise source, and complaints could be expected (USEPA 1974). This concern applies mainly to major noise sources operating at night, including draglines removing overburden, mining activities, and trucks operating on the haul road.

Visual Resources

Visual impacts of the proposed Three Oaks Mine would be caused by construction of the mine and ancillary facilities and mine operation. Visual features of the project would include clearing of vegetation, operation of draglines to strip overburden, new roadway construction, new offices and shops, mine pits, spoil piles, lignite processing and conveyance facilities, and reclamation activities. Due to the nature and scale of the project, the location of activities that may affect visual resources would change during the life of the mine, primarily in the mine disturbance area.

Evaluating the visual effects of the proposed project entailed selecting a limited number of observation points to represent the numerous possible viewing points. These “key observation points” (KOPs) were selected primarily based on points from which the public would be able to see Three Oaks Mine operations. Eight KOPs (A, C, E, G, I, J, P, and Q on **Figure 3.12-3**) were selected by a landscape architecture firm retained by Alcoa to evaluate the visibility of the draglines (Richardson Verdoorn 2002). The eight KOPs represent viewpoints from primarily public roadways on or near the perimeter of the permit area. In addition, roadways within the permit area also were selected as KOPs by the USACE, represented by numbers 1-3 on **Figure 3.12-3**.



Legend

- Existing Roads
- Road Relocations
- ● A Alpha KOPs
- ▲ 1 Numeric KOPs

N

0 2000 4000 Feet

Source: Adapted from Alcoa 2001c.

Three Oaks Mine

Figure 3.12-3

Visual Key Observation Points

6/19/02

Two draglines, currently operating at the Sandow Mine, would be moved to the Three Oaks Mine; both are approximately 404 feet long and 210 feet tall at the top of the boom. Views of the draglines were simulated using precise camera positioning and a computer-aided drafting model to locate silhouettes of the draglines in photographs from each of the letter-designated KOPs. The locations of the draglines in the photos simulated nine time periods over the 25-year life of the proposed mine (Richardson Verdoorn 2002).

The modeling was used to predict both the scale of a dragline in the view perspective and the number of days a dragline would be in view from each location. In each instance, the dragline was modeled at its closest point to the KOP where it could be seen in its entirety. At no location would the view remain constant, as the draglines move across or away from the viewpoint. Generally, the closer the dragline is to the viewpoint, the faster it would appear to move past the viewer. Conversely the farther away it is, the longer it would remain in view. For example, KOP J would have a distant view of the dragline with the longest duration at 75 percent of the 25-year life of the mine. Conversely, KOP C would have a close-up view, but the dragline would be visible for only 18 percent of the life of the mine. This concept is illustrated for KOPs I and P in **Figures 3.12-4** and **3.12-5**, respectively. **Table 3.12-11** summarizes information on the visibility of the draglines.

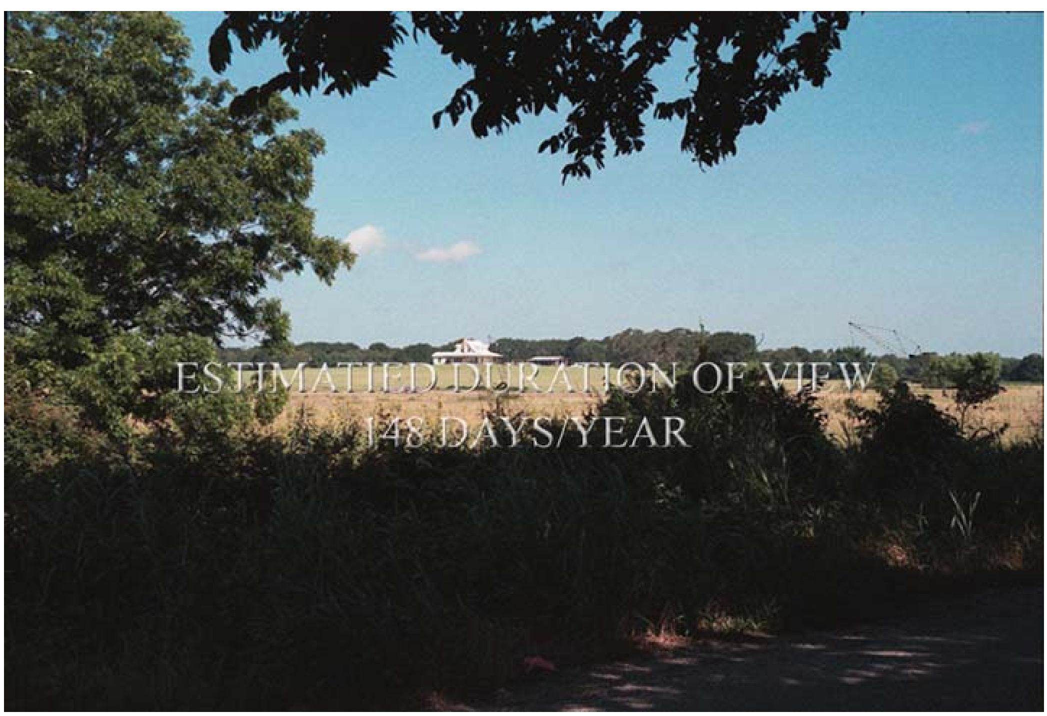
Table 3.12-11
Dragline Visibility Factors

KOP	Range[1] (feet)	Screening[2]	Visibility[3]
A	2,450	Yes	44%
C	750	No	18%
E	4,700	Yes	68%
G	1,800	Yes	51%
I	5,800	Yes	47%
J	7,800	Yes	75%
P	550	No	38%
Q	2,000	No	18%

[1]Distance from the KOP to the nearest point in the mine area.
[2]Availability of existing vegetation or terrain screening.
[3]Percent of the mine life that a dragline would be visible from the KOP.

The distance between a viewer and a dragline is a key factor in the relative dominance of the draglines from a particular view, as **Table 3.12-11** and **Figures 3.12-4** and **3.12-5** indicate. Up to a distance of approximately 0.5 mile (2,640 feet), the size of the draglines would make them visually very dominant. From 0.5 mile to approximately 2.0 miles (10,560 feet), the draglines still would be quite prominently visible, but notably less visually dominant. Beyond 2.0 miles, the draglines still would be visible in some cases, but the scale of their appearance to a viewer would be greatly reduced as other features nearer the viewer (i.e., trees, terrain, and occasionally buildings) would assume greater visual importance. The screening affect of these other features is an important visual consideration, especially at greater distances. For example, the dragline theoretically would be visible 75 percent of the time from KOP J, but the combination of distance and intervening woodlands would dramatically reduce the practical visibility from that vantage point.

Existing View



Simulated View - Years 11-15

Figure 3.12-4. Simulation of Visual Effects from Observation Point I

Existing View

Simulated View Year 1

Figure 3.12-5. Simulation of Visual Effects from Observation Point P

Vegetation removal together with pit development and any associated stockpiles would be major physical changes associated with the Three Oaks Mine. While the pit would be screened from some of the KOPs (see **Table 3.12-11**), some of the vegetation clearing and stockpiles would be visible. This would be especially notable at close range, from KOPs A, C, P, and Q during the first 4 years of the project's operation. These features would be highly visible from the numbered KOPs. As with all project-related visual resource modifications, the effects would vary over time. They would be most conspicuous from KOP 1 in the first 4 years of the mine. Subsequently, FM 696 would be relocated and KOP 1 would be included in the KOPs along the northwest side of the mine area. As reclamation progresses, the views from KOP 2 would gradually return to grassland, then to shrubland, and eventually to woodland as the active mining area moves southeasterly. Similarly, KOP 2 would have views of substantial visual modifications in the first 5 years of the project, which would be moderated as reclamation progressed. KOP 2 again would be impacted when Contingency Area 3 is mined (now estimated as years 6 through 15) and would go through another reclamation period subsequent to the mining. In contrast, the visual effects would be most obtrusive at KOP 3 in years 16 through 25, which would result in reclamation continuing after closure of the Three Oaks Mine.

Road construction activities would create new linear corridor features in the landscape. The most visible to the public would be the relocation of FM 696 and the proposed transportation and utility corridor. FM 696 would be completed by year 4 and disturbed areas would be revegetated soon thereafter. The transportation and utility corridor would be constructed at the outset of the project and would remain throughout the project's life; the transportation and utility corridor would be a strong visual feature in the landscape.

Project-related shop and office structures would be visible from KOP A and from travelers on the relocated section of FM 696. While not rural or agrarian in character, they would be of relatively modest scale and would not be highly conspicuous in the area.

Additional visual quality effects of the Three Oaks Mine would include increased night lighting and, possibly, fugitive dust generated by vehicles and equipment. Night operations at the mine would introduce lighting into what is now a rural and generally dark area. Although the lights used at the pit area would be shielded and aimed downward, there would be an overall increase in ambient light levels in the area. They would be least noticeable in clear weather, whereas low clouds or hazy conditions would tend to reflect the light outward to a greater degree. As with other visual features of the project, the effects of night lighting would vary with proximity to the active pit area.

Dust suppression measures would be implemented throughout the life of the project, and any fugitive dust resulting during transport of the lignite would likely be minor (see Section 3.8, Air Quality). The visual effects of fugitive dust would be most problematic near the transportation and utility corridor. In addition to the residences along the northwest edge of the mine area, there are approximately a dozen residences within 0.5 mile of the transportation and utility corridor that could be affected.

Implementation of the Proposed Action would notably change the overall visual character of the mine area, with lesser effects in the permit area beyond the mine disturbance area. The effects to the viewshed would be short-term for the most part; however, the proposed conceptual post-mining topography would be substantially out of scale with the existing topography in the study area and would be permanent, if implemented (see Section 3.12.4.2 for mitigation that is being considered by the USACE). Areas mined in the first years of the project would be revegetated to grasses within 1 to 2 years, with sequential pit backfill and reclamation occurring concurrent with mining over the life of the project, thereby minimizing the visual impact of raw, disturbed areas to the extent possible (**Figure 3.12-6**). As a result of concurrent reclamation, much of the mine disturbance area would be returned to a similar vegetative character as the existing permit area and its surroundings by the end of the mine's life, although the topographic modifications would be essentially permanent. The remainder of the disturbance area (i.e., ancillary facilities) would be reclaimed following the completion of mining.

3.12.2.2 No Action Alternative

Noise

The No Action Alternative would produce no specific identifiable effects on the noise environment in the study area as there would be no new mining activity and there are no known plans for other development. Over time, it is expected that there would be some increase in residential development, which would increase the ambient noise levels commensurate with the increased density. The increase in background levels likely would be small and would occur very gradually unless growth pressures in the area increase sufficiently to create demand for a suburban scale subdivision. There also could be localized increases in noise associated with drilling for and pumping of groundwater for SAWS by CPS, which owns a sizable amount of land in the study area.

Following closure of the Sandow Mine and potentially the aluminum smelter, noise levels in the vicinity of those activities would be reduced somewhat. The levels of reduction are not readily quantifiable, but the overall effect would be expected to be minor because the nearest sensitive receptors are some distance away, and the electrical generating units would continue to operate nearby.

Visual Resources

The No Action Alternative would result in no identified effects on visual quality in the study area as there would be no Three Oaks Mine-related changes to the landscape.

3.12.3 Cumulative Impacts

3.12.3.1 Noise

Noise effects of past and present actions are included in the existing noise environment for the study area (Section 3.12.1). Consequently, the cumulative impacts of these activities and the Three Oaks Mine are addressed under the Proposed Action in Section 3.12.2.1.

Closure of the Sandow Mine will have very little cumulative noise impact with the Three Oaks Mine as the major activity areas of the two mines are over 6 miles apart. There would be some potential interaction between noise from lignite transportation for Three Oaks Mine and closure activities for Sandow; however,

Reclamation After 1 Year

Reclamation After 13 Years

Figure 3.12-6. Reclaimed Mine Areas at Sandow Mine

the noise levels for these activities are relatively low, and there are no noise-sensitive receptors close enough to be seriously affected. In addition, Sandow closure activities will be short-term in nature.

The SAWS contract and other groundwater withdrawal proposals would have no identifiable noise effects in the study area except, perhaps, from wellhead pump facilities, which would be relatively small and would be unlikely to generate noise levels high enough to adversely affect noise-sensitive areas.

Future growth in the population of the study area and its surroundings will gradually shift the rural character of the landscape to one slightly more urban in character. Past trends suggest development in the noise study area will occur gradually, and background noise levels will increase slightly, consistent with the resulting population density. During the life of the mine, the cumulative noise impacts would be only very slightly greater than the effects of the mine alone. After completion of Three Oaks mining and reclamation activities, the projected future land use of the mine disturbance area would result in a noise environment at least as rural as the existing landscape and would consequently tend to counter the long-term noise increase from population growth.

Cumulative noise impacts from the planned non-mine-related transportation projects and the Three Oaks Mine would be minor. Road and highway widening will result in construction noise similar to the effects of road relocation activities proposed for the Three Oaks Mine. Construction on the U.S. Highway 290 projects will be near enough to the mine area to affect the same residences along the southern edge of the permit area. The effects will depend on the particular mine activities that were ongoing at the time of highway construction and where they were occurring. It is most likely that the effects, if any, will be minor as the mine effects alone would be minor in that area, the area is already affected by traffic noise from U.S. Highway 290, and highway construction will almost certainly be limited to daytime hours.

The proposed Houston toad regional and utilities habitat conservation plans, if implemented, would have minimal if any cumulative noise impact with the Three Oaks Mine, as they would be quite a distance from the mine. They would tend to reinforce, regionally, the long-term slowing of urbanization and retention of rural character that the mine would have on the study area as a result of the projected post-mine land use, which would reduce the overall background noise levels in the general area.

3.12.3.2 Visual Resources

Visual effects of the past and present actions are included in the existing visual resources conditions for the study area (Section 3.12.1). Consequently, the cumulative impacts of these activities and the Three Oaks Mine are addressed under the Proposed Action in Section 3.12.2.1.

Sandow Mine closure will have little or no cumulative visual impact with the Three Oaks Mine because the two mines are in different viewsheds and would not be visible from common viewpoints.

The SAWS contract and other groundwater withdrawal proposals would have no identifiable visual impacts in the cumulative effects area except, potentially, the wellhead facilities, which would be relatively small and visually unobtrusive in the context of the cumulative effects area.

Future population growth gradually will shift the rural character of the landscape to one slightly more urban in character. Past trends suggest the development in the viewshed of the permit area will occur slowly, and the visual change will be minor. During the life of the mine, the cumulative visual impacts would be only slightly greater than the impacts of the mine alone. After completion of mining and reclamation activities, the projected future land use of the mine disturbance area would result in a rural landscape character that would consequently counter to a degree the long-term effects of population growth.

Cumulative visual impacts of the planned non-mine-related transportation projects and the Three Oaks Mine would be minor to nonexistent. Road and highway widening will result in similar visual effects to the road relocation activities proposed for the Three Oaks Mine, but the unrelated projects will not be visible in the same viewsheds as the proposed project.

The visual impacts of the proposed Houston toad regional and utilities habitat conservation plans, if implemented, would have minimal, if any, cumulative visual impact with the Three Oaks Mine as they would be in different viewsheds from the mine. They would tend to reinforce, regionally, the long-term slowing of urbanization and retention of rural character that the mine would have on the study area as a result of reclamation and projected post-mine land uses.

3.12.4 Monitoring and Mitigation Measures

In addition to Alcoa's proposed environmental protection measures for noise and visual resources (see **Table 2-15**), the USACE is considering the following additional mitigation measures.

3.12.4.1 Noise

N-1: Noise Mitigation. The noise effects at sensitive receptors would be reduced somewhat by minimizing the simultaneous operation of major noise sources in close proximity to each other. Where possible, equipment with directional characteristics to their noise emissions should be oriented to direct the highest noise levels away from nearby residences, although this is made more difficult by the mobile nature of much of the equipment. Care should be taken to ensure that all motorized equipment is operating in good condition with effective mufflers intact.

N-2: Noise Barriers. To the degree possible, mine planning should use temporary spoil piles and topsoil stockpiles as berm-type noise barriers between mine activities and nearby residences. This would be particularly helpful when large equipment would be operating at the surface rather than deeper in pits, and whenever mining activity would be occurring near the residential clusters in the study area.

N-3: Sound Control. Methods should be investigated to eliminate or reduce the pure tonal character of dragline noise, believed to originate from the cooling fans (Vibra-Tech 2001). This may include active sound control methods sometimes used at electric power installations in urban areas. It also may include consultation with manufacturers of the equipment, as they may have already addressed the problem in another context.

3.12.4.2 Visual Resources

VR-1: Visual Screening. In those areas where the edge of the active mine is near the permit area boundary (e.g., portions of the western edge) and there are sensitive receptors nearby, edge conditions should be designed to minimize negative visual effects. In particular, existing vegetation should be preserved and augmented as necessary to maximize visual screening. Where possible, berms of adequate height should be placed as close to the receptor as feasible, designed to appear as an extension of the natural topography. Berming and planting should mimic natural topography, vegetative patterns, and plant materials to the degree possible to provide the most natural looking screening effects. Existing groves of trees should be retained where possible to provide visual buffers for Three Oaks Mine activities.

Similar efforts at retaining and enhancing vegetative and topographic screening should be made at the shop/office area to soften the visual effect of the industrial buildings. Large expanses of asphalt and raw dirt should be avoided whenever possible and broken up with landscape islands.

Existing vegetative screening along the transportation and utility corridor should be preserved and enhanced to minimize the visual effects of the long linear feature. Overpasses should be planted with screening materials to minimize their visual impact, consistent with TxDOT safety standards.

VR-2: Landforms. Reclamation of lands and water features should employ landforms and linear characteristics mimicking those occurring naturally in the region. The proposed conceptual post-mining topography (**Figure 2-12**) indicates large-scale, flat-topped landforms with several areas of steep geometric slopes. In comparison, the surrounding natural topography, also shown in **Figure 2-12**, exhibits a landscape broken into smaller and more irregular landforms with no straight lines or flat planes. The scale and form of the post-mining, reclaimed landscape should be more in keeping with the existing topography with smaller, less regular landforms. Shrub and tree plantings should be initiated as soon as possible after recontouring the mined areas to facilitate the return of the landscape to a natural appearance.

3.12.5 Residual Adverse Effects

3.12.5.1 Noise

Noise effects would be unavoidable with implementation of the proposed project. Noise emissions from mining activities would decrease with increased pit depth, and the effects would vary depending on the distance from mining activities to the nearest receptors. However, it is anticipated that noise emissions would exceed the HUD standard of 65 dBA (L_{dn}) in some locations. Following completion of mining and reclamation of disturbed areas, residual noise effects would be essentially nonexistent. The largely rural character of the planned future land use for the mine area indicates long-term noise levels would return to pre-mine levels.

3.12.5.2 Visual Resources

Implementation of the mitigation measures identified in Section 3.12.4.2 would decrease the visual impacts of the proposed project, and the long-term visual character of the Three Oaks Mine permit area would be largely indistinguishable from the surrounding area. Following completion of mining and reclamation of the disturbance areas, residual visual effects would be minimal.

3.13 Hazardous Materials

Issues related to hazardous materials are the potential impacts to the environment from an accidental release of hazardous materials during transportation to and from the project site or from use, storage, or a potential release at the site. In addition, potential impacts that may occur from disposal of bottom ash as a result of the naturally occurring trace elements in the lignite have been addressed in Section 3.14, Public Health.

3.13.1 Affected Environment

The study area for hazardous materials encompasses the Three Oaks Mine permit area and the local public highways. The cumulative effects area encompasses the Three Oaks Mine and Sandow Mine permit areas, the power generating facility and smelter at Rockdale, local clay mining and brick manufacturing facilities, and the local public highways. The affected environment for hazardous materials includes air, water, soil, and biological resources within the study and cumulative effects areas that could potentially be affected by an accidental release of hazardous materials during transportation to and from the proposed mine and during storage and use at the proposed mine. In addition to the regulated materials that would be transported to and utilized at the mine site, there are naturally occurring trace elements in the lignite that may become available during mining to be released to the environment as fugitive dust.

Hazardous materials, which are defined in various ways under a number of regulatory programs, can represent potential risks to both human health and to the environment when not managed properly. The term hazardous materials includes the following materials that may be utilized or disposed of in conjunction with lignite mining operations:

- Substances covered under the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200) - the types of materials that may be used in mining activities and that would be subject to these regulations would include almost all of the materials covered by the regulations identified below.

- Hazardous materials as defined under the U.S. Department of Transportation (USDOT) regulations in 29 CFR, Parts 170-177 - the types of materials that may be used in mining activities and that would be subject to these regulations would include fuels, some paints and coatings, and other chemical products.

- Hazardous substances as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and listed in 40 CFR Table 302.4 - the types of materials that may contain hazardous substances that are used in mining activities and that would be subject to these requirements include solvents, solvent containing materials (e.g., paints, coatings, degreasers), acids, and other chemical products.

- Hazardous wastes as defined in the Resource Conservation and Recovery Act (RCRA) - procedures in 40 CFR 262 are used to determine whether a waste is hazardous - the types of materials used in mining activities and that would be subject to these requirements could include liquid waste materials with a flash point less than 140°F, spent solvent-containing wastes, and corrosive liquids.

- Any hazardous substances and extremely hazardous substances as well as petroleum products such as gasoline, diesel, or propane, that are subject to reporting requirements (Threshold Planning Quantities) under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act (SARA) - the types of materials that may be used in mining activities and that would be subject to these requirements include fuels, coolants, acids, and solvent-containing products such as paints and coatings.

- Petroleum products defined as “oil” in the Oil Pollution Act of 1990 (OPA 90) - the types of materials used in mining activities and that would be subject to these requirements include fuels, lubricants, hydraulic oil, and transmission fluids.

In conjunction with the definitions noted above, the following lists provide information regarding management requirements during transportation, storage, and use of particular hazardous chemicals, substances, or materials:

- SARA Title III List of Lists or the Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the CAA.

- USDOT listing of hazardous materials in 49 CFR 172.101.

Potentially hazardous materials or substances that would be transported to and used at the Three Oaks Mine are identified in **Table 3.13-1**.

In addition to the definitions of hazardous materials described above, the State of Texas defines certain materials as Nonhazardous Industrial Wastes that, while not classified as hazardous, may pose a potential threat to human health and the environment if not managed properly. These materials are classified as Class I Nonhazardous Industrial Waste under 30 TAC, Sections 335.501 to 335.515 (Subchapter R). An example of a Class I Nonhazardous Industrial Waste would be water that is contaminated with ethylene glycol (antifreeze).

Certain types of materials, while they may contain potentially hazardous constituents, are specifically exempted from regulation as hazardous wastes. Used oil, for example, may contain toxic metals, but would not be considered a hazardous waste unless it meets certain criteria (Characteristics of Hazardous Waste 40 CFR 261). Used oil recycling is regulated under 30 TAC Chapter 324.

Table 3.13-1
Potentially Hazardous Materials or Substances to be Used at the Three Oaks Mine

Material	Annual Use	Unit
Diesel	3,458,324	gallons
Gasoline	116,084	gallons
Wagner brake fluid	24	gallons
AW68 Chevron hydraulic oil (55 gallon drums)	8	drums
ISO 46 Chevron hydraulic oil	14,136	gallons
ISW40 DELO 400 Chevron engine oil	24,723	gallons
50W gear oil	11,339	gallons
Antifreeze	6,294	gallons
WD-40 can spray	365	each
Penatrant 50K can spray	251	each
Lubricant hydraulic oil	19	gallons
Paint spray cans	500	each
Anti-sieze spray cans	97	each
Anti-sieze 1-lb can	59	each
Anti-sieze 8-lb can	4	each
Sealant, gasket paste, form a gasket, 11 oz	14	each
Sealant, gasket paste, Aviat (Penetex)	15	pints
Sealant, gasket paste, Teflo (Penetex) 4 oz	78	each
Adhesive, Caterpillar, form-a-gasket	7	each
Adhesive, Tabers product, 2 oz bottle	3	each
Adhesive, adhesive cement, 5 oz tube	17	each
Adhesive, adhesive cement, 8 oz tube	74	each
Adhesive, adhesive cement, putty bunge	15	each
Exterior enamel paint	18	gallons
Thinner	10	gallons
Open gear lubricant 936SF	44,054	pounds
EP greese 777	28,763	pounds
Cam and slide lubricant 908SF	8,795	pounds
Neetsfoot oil	38	quarts

Source: Hodges 2001.

3.13.2 Environmental Consequences

3.13.2.1 Proposed Action

Hazardous Materials Used in Mine Operations

Operation of the proposed Three Oaks Mine would involve the transport, handling, storage, use, and disposal of hazardous materials. The estimated annual use of these materials is listed in **Table 3.13-1**. In addition, herbicides and pesticides would be used, as needed, in association with reclamation activities. These materials, as well as their handling and application procedures, are presented in Section 2.5.3.5, Revegetation. Potential effects associated with pesticide and herbicide use are discussed under Surface Water Quality Impacts in Section 3.2.4.

The proposed mining operation would require the use of the following materials classified as hazardous or potentially hazardous: diesel fuel, gasoline, oils, greases, anti-freeze, and solvents used for equipment operation and maintenance. Numerous other hazardous materials may be utilized in mining and maintenance operations; they would be stored and used in relatively small quantities (e.g., materials in aerosol cans). In addition to the hazardous materials that would be used or consumed during mining operations, hazardous waste, industrial waste, and used oil potentially may be generated. All of these materials would be managed according to the OSHA standard and according to the other regulatory programs identified in Section 3.13.1, Affected Environment.

A release of a reportable quantity of a hazardous substance to the environment must be reported within 24 hours to the National Response Center (40 CFR Part 302). Sections 327.1 to 327.5 of the TAC contain spill response and reporting rules. Also, the Texas Water Code Sections 26.039 and 26.262 contain provisions for reporting and abatement of a spill of a reportable quantity of a hazardous substance to the waters of the State. All reportable spills would be mitigated, and contaminated materials would be disposed of in accordance with federal and state regulations.

Non-hazardous solid wastes generated at the facility would be disposed of in accordance with state and federal regulations. Hazardous wastes generated at the Three Oaks Mine would be transported by approved transporters to licensed hazardous waste disposal facilities. All hazardous wastes would be stored, packaged, and manifested in compliance with applicable federal and state regulations.

Potential Transportation Impacts

All hazardous substances would be transported by commercial carriers in accordance with the requirements of Title 49 of the CFR. Carriers would be licensed and inspected as required by the TxDOT. Tanker trucks would be inspected and would have to be properly certified by the State of Texas. These permits, licenses, and certificates would be the responsibility of the carrier. Title 49 of the CFR requires that all shipments of hazardous substances be properly identified and placarded. Shipping papers must be accessible and include Material Safety Data Sheets (MSDS) describing the substance, immediate health hazards, fire and explosion risks, immediate precautions, fire-fighting information, procedures for handling leaks or spills, first aid measures, and emergency response telephone numbers.

Trucks would be used to transport a variety of hazardous materials to the mine. Shipments of hazardous materials would originate from cities such as Austin or Houston, Texas, and would be transported via U.S. Highway 290. From U.S. Highway 290, the substances would be transported along FM 696, a paved rural two-lane road that would access the mine facility area.

Based on annual use, the material of greatest risk for a spill during transport would be diesel fuel. Alcoa anticipates a delivery frequency of 29 diesel fuel trucks each month over the life of the mine (estimated to be 25 years of active mining) based on annual diesel usage presented in **Table 3.13-1**. This would result in a total of approximately 8,650 shipments of diesel fuel (346 shipments per year for 25 years). Due to the large number of deliveries, the risk of a spill during transport was evaluated for diesel fuel (**Table 3.13-2**).

For this analysis, diesel fuel was assumed to be shipped from Austin, Texas. The fuel would be transported approximately 25 miles along U.S. Highway 290 from Austin to Butler, Texas, and then approximately 5 miles along FM 696 to the mine site. This route would transport these substances through the towns of Austin, Manor, Elgin, and Butler.

The probability of an accident resulting in a release involving deliveries of diesel fuel was calculated using the Federal Highway Administration truck accident statistics (Rhyne 1994), as presented in **Table 3.13-2**. According to these statistics, the average rate of truck accidents for transport along a rural interstate freeway is 0.64 per million miles traveled. For rural two-lane roads, the average truck accident rate is 2.19 accidents per million miles traveled.

The probability of a release or spill was based on accident statistics for liquid tankers carrying hazardous materials (Rhyne 1994). These statistics indicate that on the average, 18.8 percent of accidents involving liquid tankers carrying hazardous materials resulted in a spill or release.

Using the accident and liquid tanker spill statistics, the probability analysis indicates that over the 25-year-life of the project there would be approximately a 5 percent chance that one accident would occur resulting in a release of diesel fuel. Adding the other shipments of other materials listed in **Table 3.13-1** would incrementally increase the odds of a release of a hazardous substance during a transport accident.

The environmental effects of a release would depend on the substance, quantity, timing, and location of the release. The event could range from a minor oil spill on the mine site where cleanup equipment would be readily available, to a severe spill during transport involving a large release of diesel fuel or another hazardous substance. Some of the chemicals could have immediate adverse effects on water quality and aquatic resources if a spill were to enter a flowing stream. However, considering the anticipated transport routes and the lack of perennial streams along the route, the probability of a spill directly into a waterway is very low. Therefore, it is unlikely that spills of these materials would affect waterways. With rapid cleanup actions, diesel fuel contamination would not result in a long-term increase in hydrocarbons in soils, surface water, or groundwater.

Table 3.13-2
Estimated Number of Potential Spills Resulting from Truck Accidents

Truck Shipment Type	Total Truck Deliveries[1]	Haul Distance	Accident Rate per Million Miles Traveled[2]	Calculated Number of Accidents over Life-of-Mine	Probability of Release Given an Accident (%)[2]	Calculated Number of Spills	Total Estimated Number of Releases
Rural Freeway							
Diesel fuel	8,650	25	0.64	0.1384	18.8	0.03	0.05
Rural Two-lane Road							
Diesel fuel	8,650	5	2.19	0.095	18.8	0.02	0.05

[1]Total truck deliveries = estimated number of truck deliveries (10,000 gallons per delivery) over the life of the project; assumed to be 25 years for the Proposed Action.
[2]Accident rates are based on the average number of truck accidents occurring per million miles traveled by road type. Spill probabilities are based on statistics from accident reports that indicate the percentage of truck accidents involving liquid tankers that resulted in a spill.

Source: Rhyne 1994.

A large-scale release of diesel fuel or several of the other substances delivered to the site could have implications for public health and safety. The location of a release again would be the primary factor in determining the effects of a release. However, the probability of a release anywhere along a proposed transportation route was calculated to be low; the probability of a release within a populated area would be even lower; and the probability of a release involving an injury or fatality would be still lower. Therefore, it is not anticipated that a release involving a severe effect to human health or safety would occur during the life of the project.

Potential Storage and Operational Impacts

The volumes of fuels and lubricants to be stored onsite in tanks are listed in **Table 2-10**. Additionally, mobile tanker trucks would be used onsite to fuel and maintain draglines, haul trucks, and other equipment. Stationary tanks and vessels would be positioned within appropriate containment or diversionary structures to prevent oil or hazardous material from reaching soils or water. In addition, secondary containment structures constructed of concrete would be sufficient to hold at least 110 percent of the volume of the largest tank in the containment area. Portable tanks and drums also would be stored in a manner to prevent spills from reaching soils or water. Used oil would be recycled to a licensed used oil recycler during the life of the mine.

Over the life of the project, the probability of minor spills of materials such as fuel and lubricants would be relatively high. These releases could occur during fueling operations or from equipment failure (e.g., hydraulic hose failure). Spills of this nature would be localized, contained, and disposed of in accordance with the applicable laws and regulations. Accidents involving other hazardous materials also could occur during mine operation. Alcoa would develop and maintain a site-specific Spill Prevention, Control, and Countermeasure (SPCC) Plan to deal with unplanned releases of petroleum products and other hazardous materials. Alcoa has prepared an Emergency Response Plan that establishes procedures for responding to accidental spills or releases of hazardous materials to minimize health risks and environmental effects. The plan includes procedures for evacuating personnel, maintaining safety, cleanup and neutralization activities, emergency contacts, internal and external notifications to regulatory authorities, and incident documentation. Proper implementation of the Emergency Response Plan is expected to minimize the potential for significant impacts associated with potential releases of hazardous materials.

Using proper handling and storage procedures, impacts resulting from spills of hazardous materials should be minimal. MSDSs for the hazardous materials stored and used at the mine would be maintained onsite.

3.13.2.2 No Action Alternative

Under the No Action Alternative, no Three Oaks Mine-related impacts resulting from transportation, storage, use, or disposal of hazardous materials would occur.

3.13.3 Cumulative Impacts

The Proposed Action would result in an incremental increase in the amount of hazardous materials shipped along the identified transportation routes. The additional amounts of hazardous materials being transported would increase the risk of release of hazardous materials from truck accidents during the life of the project. On U.S. Highway 290 this would represent a small incremental increase over existing conditions due to the existing high truck transport volume. On FM 696 between Butler, Texas, and the permit area, this increase would represent a larger incremental increase in the risk of a spill during transport since the roadway is a rural road assumed to have a relatively low truck traffic volume. With proper implementation of spill prevention and/or emergency response plans, cumulative impacts associated with storage and use of hazardous substances at the site are not anticipated.

The Proposed Action would represent an incremental increase in the transportation of hazardous materials in addition to the Sandow Mine and the clay mining and brick manufacturing operations. Since the Sandow Mine is scheduled for closure shortly after initiation of mining at Three Oaks, the cumulative impacts due to the increase in hazardous materials traffic would be short-term.

According to Alcoa, the aluminum smelter and electrical power station generate approximately 3,868 tons of hazardous waste per year (Waclawczyk 2001). Ninety-five percent of the waste is reportedly from smelter operations. Assuming that the Three Oaks Mine would continue to supply approximately the same amount of lignite as supplied by the Sandow Mine and the smelter output is not greatly increased, then the potential amount of hazardous waste produced by the smelter would not be expected to increase. In addition, economic and regulatory incentives to minimize the generation of hazardous waste may even reduce the amount of waste generated in the future, even if aluminum production is static or increases. Therefore, the Proposed Action is not expected to have a cumulative impact on the generation of hazardous waste.

3.13.4 Monitoring and Mitigation Measures

Alcoa proposes to construct spill containment structures at fuel storage facilities. All waste oils and lubricants would be shipped to a licensed recycler. No additional monitoring or mitigation for hazardous materials is being considered.

3.13.5 Residual Adverse Effects

Residual adverse effects as a result of the transport of a hazardous material would include the potential effects to a populated area or a sensitive environmental resource along the proposed transportation route in the event of a spill. Residual adverse effects from the use of hazardous materials on the project site would depend on the substance, quantity, timing, location, and response involved in an accidental spill or release. Prompt cleanup of spills and releases should minimize the potential for any residual adverse effects of such events. As previously discussed, due to the low probability of impacts of spills on water resources or within populated areas, the potential for residual adverse impacts are anticipated to be minimal.

3.14 Public Health

3.14.1 Proposed Action

Public health issues associated with the proposed Three Oaks Mine include potential water quality effects from the mining operation, including bottom ash disposal and the use of chemicals during reclamation; air quality effects from mine-related air emissions; and the effects of mine noise and light pollution on sensitive receptors. The potential direct impacts to these resources are discussed in Sections 3.2.2, 3.8.2, and 3.12.2, respectively. Public health issues related to potential cumulative impacts include water quality effects from groundwater withdrawals for SAWS, and air quality effects from the existing Rockdale power plant and aluminum smelter. The potential cumulative impacts to water resources and air resources are discussed in Sections 3.2 and 3.8, respectively.

This section summarizes the potential effects to the public health of local residents from mine-related direct and cumulative water quality, air quality, and noise and light effects.

3.14.1.1 Water Quality Effects

The USEPA (Federal Register 2000) has identified issues regarding the disposal of coal combustion materials (i.e., bottom ash and fly ash) in surface impoundments that lack adequate controls (e.g., groundwater monitoring, liners). However, in regard to the disposal of combustion materials into mine pits, the agency acknowledged that it had not “identified a case where placement of coal wastes can be determined to have actually caused increased damage to groundwater.” In light of the uncertainties of impacts from the disposal of coal combustion wastes, the USEPA is considering the development of federal regulations for disposal of fossil fuel combustion materials, but not as hazardous waste (Federal Register 2000).

The TNRCC has approved Alcoa’s use of bottom ash (a designated Class III waste) as a haul road aggregate at the Sandow Mine. Use of bottom ash as haul road aggregate also is proposed for the Three Oaks Mine (Alcoa 2000 [Volume 8]). As pit areas are backfilled, the bottom ash on the haul roads would be incorporated into the backfill material or disposed of at an approved Class III facility. As discussed under Groundwater Quality Impacts in Section 3.2.3.2, incorporation of bottom ash into the backfill material is not anticipated to degrade groundwater and thus is not expected to pose a health risk.

Alcoa would contract with qualified individuals or companies to apply fertilizers and pesticides on reclaimed areas as needed, to ensure successful reclamation. These contractors would operate in accordance with manufacturer recommendations and agency regulations regarding application rates and handling of materials. No bulk fertilizer or pesticide materials would be stored on the mine site, and associated waste materials would be disposed at appropriate offsite facilities. Spills or other accidental releases would be handled in accordance with Alcoa’s SPCC Plan, which addresses accidental releases of all hazardous materials used at the facility. Use of fertilizers and pesticides on the reclaimed areas at the Three Oaks Mine is not anticipated to constitute a risk to water quality in local streams or groundwater based on the implementation of spill prevention measures and adherence to recommended application procedures. Therefore, use of these materials is not expected to pose a health risk to surrounding residents.

3.14.1.2 Air Quality Effects

The presence of trace elements in lignite that are classified as HAPs can be a cause for concern. Although the trace element concentrations are comparable to those in soil, the burning of lignite may make these trace elements available in the environment.

Some of the naturally occurring trace elements in coals have been classified as HAPs by the 1990 CAAA. These elements are arsenic, beryllium, cadmium, chromium, mercury, manganese, nickel, lead, antimony, selenium, and uranium. **Table 3.14-1** lists the concentrations of these elements in Wilcox coals in the East-Central Texas region (representative of the lignite to be mined at Three Oaks) and compares them to

Table 3.14-1
Comparison of Average Concentrations of Trace Elements in Coal, Lignite, and Soil (concentrations in ppm)

Constituent	Near-Surface Wilcox Coals in East-Central Texas[1]	Texas Lignites Overall[2]	Other U.S. Lignites[1]	Concentration in Soils (Western U.S. West of 96th Meridian)[2]	
				Average	Range
Antimony	1.7[3]	No Data	No Data	0.47	<1 – 2.6
Arsenic	4.5	3.5	6	5.5	<0.10 – 97
Beryllium	1.9	1.9	2.0	0.68	<1 – 15
Cadmium	1.2	0.86	1.0	--	--
Chromium	24	19	20	41	3 – 2,000
Lead	11	9.3	14	17	<10 – 700
Mercury	0.2	0.17	0.16	0.046	<0.01 – 4.6
Manganese	126	151	100	380	30 – 5,000
Nickel	17	14	15	15	5 – 700
Selenium	6.3	6.7	5.3	0.23	<0.1 – 4.3
Uranium	2.5	2.2	2.5	2.5	0.68 – 7.9

[1]Tewalt 1986.
[2]Shacklette and Boerngen 1984.
[3]Crowley 1995. Average from Calvert Mine A1 Seam.

average elemental concentrations found in lignites in Texas and the U.S. **Table 3.14-1** also compares the concentrations of trace elements in the lignites to the naturally occurring trace element concentrations in soils of the western U.S. The average concentrations of trace elements in Wilcox coals in East-Central Texas are generally comparable to the concentrations of those elements in Texas and U.S. lignites. In addition, the average trace element concentrations in the lignites are very similar to average trace element concentrations measured in soils in the western U.S. (Shacklette and Boerngen 1984). Although the average concentrations of beryllium and antimony in the lignites are an order of magnitude higher than the average concentrations for those elements in soil, the concentrations in the lignites are well within the overall range of concentrations in soil. The average concentrations of selenium in the lignites are an order of magnitude higher than the average for soil, but do not greatly exceed the upper end of the overall concentration range in soil. As a result, the naturally occurring concentrations of trace elements in lignite are very similar to naturally occurring concentrations of those elements in soil.

As discussed in Section 3.8.2.1, the acceptable 8-hour public exposure limit for selenium is approximately 2 $\mu g/m^3$. This public exposure limit is nearly 500 times higher than the predicted maximum concentrations that would be produced by the mine at locations accessible to the public, indicating low human health risk due to selenium in fugitive dust at the proposed mine.

The USEPA is in the process of developing HAP emission standards, and proposed rules are expected to be issued for public comment in December 2003 (USEPA 2001). At this time, neither the specific emission standards for certain HAPs that may be protective of public health and the environment nor the technologies that may be necessary to abate emissions of these constituents have been identified (Federal Register 2000).

The existing Rockdale power generating facility and aluminum smelter are considered interrelated projects (see Section 2.6) for the consideration of potential cumulative impacts with the proposed Three Oaks Mine effects in this EIS. The USACE considered whether there would be an "…impact to the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions…" (CEQ 1997). As discussed in Section 3.8.2.1, the air quality impacts of the Three Oaks Mine would be primarily particulate emissions from the mining and handling of lignite. There also would be some point source emissions from mining and lignite handling equipment. These emissions are anticipated to be localized within and near the permit area and would be below levels that would constitute a health hazard. Therefore, it is not anticipated that the direct and indirect impacts of the proposed project would overlap or interact with emissions from the existing Rockdale industrial facilities, (e.g., the electrical generating plants and the smelter) resulting in cumulative environmental impacts.

Since the proposed Three Oaks Mine is replacing lignite from the Sandow Mine with no appreciable change in power plant utilization, no cumulative impacts from the two mines are expected. Since there appears to be no strong trend for an increase of lignite utilization in the near future with resultant opening of new mines and associated power plants, no cumulative impacts as a result of the Proposed Action would be expected.

3.14.1.3 Noise Effects

There are no federal, state, or local noise regulations that would govern the proposed Three Oaks Mine. However, in order to evaluate potential impacts from the proposed project, the impact assessment in this EIS was based on the HUD standard for acceptable noise levels in residential areas of an L_{dn} of 65 dBA (HUD 1984).

Alcoa has conducted studies to determine ambient noise levels and to estimate noise emissions from the proposed project at residences in proximity to the proposed mining activities (see Section 3.12). The USACE reviewed the study results and independently evaluated potential noise impacts. Results of the impact assessment indicate a few instances of residences in close proximity to the permit area where individual and combined project-related noise emissions would exceed the HUD 65 dBA standard and where noise levels would be above existing ambient background noise (see Section 3.12.2.1). These impacts would be most noticeable during nighttime operations. Dragline noise emissions, in particular, would exhibit pure tonal qualities that may be noticeable above other noise levels, particularly during nighttime hours. Mitigation measures are being considered to reduce the effects of noise emissions (see Section 3.12.4.1, Noise and Visual Resources). Temporary noise levels slightly in excess of the HUD standard are not expected to cause adverse health effects.

3.14.1.4 Light Effects

As discussed in Section 3.12.2.1, there would be an increase in night lighting during nighttime operations of the proposed Three Oaks Mine. Nighttime operations would introduce new lighting into what is now a rural and generally dark area. The night lighting would be most noticeable during weather conditions of low clouds or hazy conditions, which would result in greater light reflection. These effects would vary depending on the location of the receptor residence to the active pit area. Alcoa has committed to the use of light shields to direct the lights downward, to the extent possible. Increased night lighting is not expected to result in adverse health effects.

3.14.2 No Action Alternative

Under the No Action Alternative, the mine-related effects identified for water quality, air quality, noise, and lighting, as discussed above, would not occur. In addition, the No Action Alternative would result in the closer of Alcoa’s aluminum smelter, thereby resulting in the elimination of emissions from that facility. However, as discussed in Section 2.3, No Action Alternative, it is assumed that the four electrical generating units at Rockdale would be converted to use western coal for continued operation.

3.15 Environmental Justice

Executive Order No. 12898 is "intended to promote nondiscrimination in Federal programs substantially affecting human health and the environment, and to provide minority communities and low-income communities access to public information on, and an opportunity for participation in, matters relating to human health and the environment."

Council on Environmental Quality guidelines (CEQ 1998) for evaluating potential adverse environmental effects of projects require specific identification of minority populations when either: 1) a minority population exceeds 50 percent of the population of the affected area, or 2) a minority population represents a meaningfully greater increment of the affected population than of the population of some other appropriate geographic unit, as a whole. Neither of these circumstances was found to exist in the vicinity of the Three Oaks Mine. Hispanics and Latinos (of any race) are the largest minority population group in each of the three study area counties. However, they represent a notably smaller percentage of the local population than of the statewide population. Similarly, Black/African Americans are a smaller percentage of the total population in Bastrop (8.8 percent) and Milam (11.0 percent) Counties than of the state (11.5 percent); in Lee County they represent a slightly higher 12.1 percent of the population. Native Americans make up 0.6 percent of Texas' population and 0.7 percent, 0.5 percent, and 0.5 percent of the Bastrop, Lee, and Milam County populations, respectively. None of these figures represent a "meaningfully greater increment of the affected population." Consequently, there is no evidence to suggest minority populations would be disproportionately adversely affected by development of the Three Oaks Mine.

An extensive effort was made to provide all interested parties in the project vicinity with access to public information and opportunities to participate in the review process for the project. An informational letter was sent to individuals, organizations, and state and local agencies describing the proposed project and requesting comments. Similar notices were published in newspapers in the area. See Section 4.1 for additional information on the public notification process. Every effort was made in the public consultation process to ensure that access to information was available to all interested parties in a non-discriminatory manner.

In addition, direct consultation was initiated in 1999 and again in 2001 with the five Native American tribal groups associated with the permit area to ensure that any concerns they had regarding the project would be addressed (see Section 3.7.1.4).

3.16 Energy Requirements and Conservation Potential

Energy for the proposed Three Oaks Mine would be supplied primarily by lignite, electricity, and diesel fuel. Lignite is the fuel source for the Rockdale electrical generating facilities. At full capacity, the power generating units use approximately 7 million tons of lignite annually. Electricity would be used to power the draglines and ancillary facilities, pump water used in the operation, and provide lighting for mining activities. The electrical load would be approximately 10 MW. Diesel fuel would be used to power mobile equipment; approximately 3.5 million gallons per year would be used. Life-of-project energy consumption is estimated below:

- Lignite – 175 million tons
- Electricity – 2,200,000 MW-hours
- Diesel fuel – 87.5 million gallons

As described in Section 1.2, aluminum smelting is an energy-intensive industry. Alcoa continually evaluates options for energy conservation in the smelting process in order to reduce the amount of lignite required for electrical power.

3.17 Relationship Between Short-term Uses of the Human Environment and the Maintenance and Enhancement of Long-term Productivity

As described in the introduction to Chapter 3.0, short-term is defined as the 25-year operational life of the mine and 10-year reclamation period; long-term is defined as the future following reclamation. This section identifies the tradeoffs between the short-term impacts to environmental resources during operation and reclamation versus long-term impacts to resource productivity that extend beyond the end of reclamation. Note that this discussion is not applicable to hazardous materials, public health, or environmental justice.

3.17.1 Geology and Mineral Resources

Short-term lignite mining at the Three Oaks Mine would not affect the long-term potential for development of mineral resources in east-central Texas.

3.17.2 Water Resources

Short-term groundwater impacts include effects to groundwater wells located within the area of potential groundwater drawdown associated with mine-related dewatering and depressurization of the Calvert Bluff and Simsboro aquifers, respectively. These impacts would occur during mining operations and for a period up to approximately 100 years until the recovery of groundwater levels in the aquifers. However, Alcoa would be responsible for the mitigation of mine-related impacts to groundwater wells in compliance with RRC requirements, thereby minimizing the duration of the impact.

Short-term surface water impacts would include the beneficial increase in flows downstream of the Three Oaks Mine surface water discharge locations in the Big Sandy and Middle Yegua drainages. Following the cessation of discharges, there would be a reduction in flows in these drainages associated with groundwater effects in the recharge areas of the Simsboro aquifer that provide flow in these drainages and runoff reduction associated with post-mining topographic changes. Following the recovery of the groundwater levels in the gaining reaches of these streams, there would be minor long-term effects to the productivity of these drainages.

The proposed project would result in the short-term loss of wetlands and waters of the U.S. related to mine pit development and depressurization of the Simsboro aquifer. Reclamation of wetlands and waters of the U.S. would occur upon completion of mining. Long-term impacts to wetland productivity would be limited to the wetlands located in the Simsboro outcrop, which could be affected by a drawdown in the water table. This drawdown would take approximately 40 to 100 years to rebound following the termination of pumping.

3.17.3 Soils

The proposed project would result in both short- and long-term impacts to soil productivity. These impacts are expected to cease with the completion of mining operations and would be mitigated by reclaiming the disturbed areas. The reclamation goal is to develop more productive soils to ensure the success of revegetation, stabilization of the disturbed areas, and soil erosion control. Long-term impacts to soil productivity would include the permanent net loss of approximately 825 acres of soils to the development of ponds and end lakes.

3.17.4 Vegetation

The proposed project would result in adverse short-term impacts such as the temporary loss of vegetation. These impacts are expected to end upon completion of mining operations and would be mitigated by reclaiming the disturbed areas.

Impacts to the long-term productivity of the disturbed areas would depend primarily on the effectiveness of reclamation of the disturbed areas. The reclamation goal is to return the disturbed areas to productive post-mining land uses. The revegetation also is expected to stabilize the disturbed surfaces, control soil erosion, and inhibit the establishment of invasive plant species on these areas. Under typical moisture conditions at the mine, it is expected that initial reclamation would result in sparse stands of perennial grasses and some shrubs. With proper management, this initial vegetation community should evolve toward a greater abundance of perennial grasses and native shrub and trees species. If initial reclamation of the area occurs in years with above-average precipitation, grasses and shrubs may establish more quickly, thus hastening the succession of a self-sustaining mixture of native vegetation. There would be long-term losses of vegetation associated with the development of ponds and end lakes (net loss of approximately 825 acres).

3.17.5 Fish and Wildlife Resources

Short-term impacts associated with wildlife resources, including special status species and species of special concern, would consist of habitat removal and disturbance within the permit area as a result of mine-related surface disturbance activities. As discussed above for vegetation, the reclamation goal is to re-establish self-sustaining plant communities including wildlife habitat and surface water features (i.e., ponds and end lakes). Long-term impacts to wildlife resources would be the reduction of available surface water and riparian and wetland habitats as a result watershed modifications within the permit area. Mine-related groundwater drawdown within the Simsboro aquifer outcrop would affect wildlife habitat until riparian and wetland habitats become re-established following groundwater recovery.

Short-term impacts would consist of reduced flows and loss of aquatic habitat in portions of Little Sandy Creek and Middle Yegua Creek as a result of depressurization of groundwater in the Simsboro aquifer. Impacts to the long-term productivity of aquatic communities (primarily macroinvertebrates) would occur due to the loss of 23.6 acres of intermittent/ephemeral streams and 69.9 acres of ponds. There would be a net increase of 825 acres of aquatic habitat associated with the ponds and end lakes.

3.17.6 Paleontological Resources

Short-term impacts to paleontological resources would include the loss of fossils, if present, on or within the Calvert Bluff Formation within the proposed disturbance area. However, based on the type and prevalence of the fossils that would be lost, the short-term impacts would be minor and would not affect the long-term potential for recovery of similar fossil resources regionally.

3.17.7 Cultural Resources

Short-term and long-term impacts to cultural resources would include the permanent direct loss of 134 archaeological sites within the proposed disturbance area. As treatment for NRHP-eligible sites would be completed prior to ground disturbance, the scientific information associated with these resources would be preserved for the long-term.

3.17.8 Air Quality

Short-term impacts to air quality from emissions associated with mine construction and operation would have no effects on the long-term productivity of the permit area or surrounding region. Air quality impacts would be restricted to within approximately 7 kilometers (4 miles) of activity areas.

3.17.9 Land Use and Recreation

Short-term use for lignite extraction would temporarily replace livestock grazing, a small amount of crop production, several residences, and wildlife habitat. Prior uses, except for most residences, would be reinstated after reclamation, although the balance of uses would shift to more fish and wildlife habitat and developed water resources. Productivity of prime farmland would be restored through careful management of topsoil resources. There is a very small amount of existing private, dispersed recreation use in the mine area. Resources would be available after closure to restore and enhance recreation opportunities, although there is no plan to provide public access for recreation purposes.

3.17.10 Social and Economic Values

The short-term maintenance of existing employment, population, and economic activity would accrue for the duration of the project, enabling continuation of the aluminum smelter operation for the life of the mine. Continuation of economic activity beyond the 25-year life of the mine operation is unknown at this time.

3.17.11 Transportation

There would be project-related increases in traffic in the study area during the life of the mine. There also would be short-term and long-term road relocations. Changes to the road pattern and improvements to several state and county roadways would continue indefinitely.

3.17.12 Noise and Visual Resources

Elevated noise levels would occur in and near the permit area for the life of the mine, but noise would revert to lower levels at closure. Visual degradation would occur during active mining, but the rural landscape character would be gradually reestablished throughout the disturbance area as reclamation progresses behind the mining. It would take several years beyond the life of the mine for adverse visual effects to diminish in the later disturbance areas while larger vegetation types become established.

3.18 Irreversible and Irretrievable Commitment of Resources

The Proposed Action could result in the irreversible commitment of resources (e.g., the loss of future options for resource development or management, especially of nonrenewable resources, such as minerals and cultural resources) or the irretrievable commitment or resources (e.g., the lost production or use of natural resources during the life of the operations). Irreversible and irretrievable impacts of the Proposed Action are summarized for each resource in **Table 3.18-1**.

Table 3.18-1
Irreversible and Irretrievable Commitment of Resources by the Proposed Action

Resource	Irreversible Impacts	Irretrievable Impacts	Description
Geology and Mineral Resources	Yes	Yes	Lignite mining would cause an irreversible change in the topography of the permit area and an irreversible and irretrievable commitment of the 175 million tons of lignite that are mined, which would not be available for future use.
Water Resources	Yes	Yes	Groundwater levels affected by mine dewatering and depressurization would recover in the long-term. The groundwater lost during mine operations is considered an irretrievable resource commitment. After recontouring and reclamation, surface water runoff would be decreased in Middle Yegua Creek and Big Sandy Creek as a result of topographic changes. Most of the retained flow would be lost by increased evaporation from the end lakes and other permanent impoundments developed as part of the wetlands mitigation efforts. As a result, the magnitude and duration of low flows and the duration and extent of perennial pools may decrease in the affected stream reaches. These flow restrictions and increased evaporation losses would be irreversible and irretrievable impacts to surface water resources. There would be an irretrievable loss of 67.4 acres of jurisdictional waters of the U.S., including 19.9 acres of ephemeral stream channels, 3.7 acres of intermittent stream channels, 5.3 acres of wetlands, and 38.5 acres of on-channel ponds during mine operation. Additionally, four wetlands ranging from approximately 0.2 to 1.5 acres may be irretrievably impacted within the Simsboro outcrop where aquifer depressurization may decrease surface hydrology.
Soils	Yes	No	Suitable soils from project disturbance areas would be salvaged for use in reclamation. There would be an irreversible commitment (i.e., loss) of approximately 825 acres of soils associated with the end lakes.
Vegetation	Yes	Yes	A total of 8,654 acres would comprise an irretrievable commitment of vegetation resources during project operations; this acreage subsequently would be revegetated with the exception of areas reclaimed as water features (ponds and end lakes). Water feature development would result in an irreversible net loss of approximately 825 acres of vegetation.

Table 3.18-1 (Continued)

Fish and Wildlife Resources	Yes	Yes	There would be an irretrievable loss of 23.6 acres of intermittent/ ephemeral stream and 69.9 acres of pond habitat as a result of mining. A net total of approximately 825 acres of terrestrial habitat would be irreversibly lost as a result of conversion to water features (i.e., ponds and end lakes). A total of 8,530 acres of wildlife habitat would be incrementally lost during mining operations, an irretrievable commitment of this resource. This land would be reclaimed subsequent to mining.
Paleontological Resources	No	No	No impacts would occur to paleontological resources.
Cultural Resources	Yes	Yes	Cultural resources would be irreversibly and irretrievably lost through disturbance; however, significant cultural resources would be mitigated through avoidance or data recovery.
Air Quality	No	No	There would be no irreversible impacts to air quality. Project air impacts would not exceed federal or state ambient air quality standards. The air quality would return to pre-mining levels after construction, mining, and reclamation activities ceased to be sources of pollutants.
Land Use and Recreation	Yes	Yes	Changes in land use would generally be reversible through reclamation efforts, except for end lake areas where the enlarged water features would be considered a beneficial impact by users. Suitability of reclaimed areas for structures is uncertain, depending on the stability of backfilled soils. There would be no irreversible or irretrievable loss of recreation resources.
Social and Economic Values	No	Yes	Social and economic effects of the Three Oaks Mine, though predominantly beneficial, would be reversible. The human and material resources invested in the project would be essentially irretrievable.
Transportation	No	No	Project-related traffic increases would continue for the life of the project, but would be reversible and would cease at project closure. Road system modifications would be reversible, should it be determined to be desirable in the future.
Noise and Visual Resources	No	No	Noise effects would be considered reversible, as they would cease on completion and closure of the project. Certain visual effects, particularly removal of mature trees, would persist for a number of years; however, in the long term, the adverse visual effects would be largely obscured by successful reclamation and vegetation.
Hazardous Materials	No	No	Not applicable.
Public Health	No	No	Adverse public health impacts are not anticipated.
Environmental Justice	No	No	Not applicable.